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ABSTRACT

This document comprises the entire output of the journal for 1997. In the first article, "How Can Educational Psychology Be Meaningful?," E. Jensen's 1995 book, "Brain-Based Learning and Teaching," is reviewed, concluding that the book would be valuable for any teacher who wants to improve the level of students' learning. "Accelerative Learning and the Emerging Science of Wholeness," discusses the "new sciences" and suggestology, concluding that these new approaches have offered viable alternatives to traditional ways of viewing the universe. "Suggestopedia, Biofeedback and the Search for the Alpha State" discusses current research and trends in brain-wave-based learning. "Computerized Slideshows: A Modern Extension of Accelerated Learning Techniques," "New Employee Orientation Using Accelerated Learning Techniques," and "On Learning and Knowledge--Review" all discuss the efficacy and future of accelerated learning techniques and the possibilities of incorporating new technologies into the pedagogical process. (Each article contains references.) (KFT)

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Nancy Omaha Boy, Editor

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How Can Educational Psychology Be Meaningful?

**A Review of Jensen, E. (1995)
Brain-based learning and teaching**

**Louette McGraw and Ann Nevin¹
Arizona State University West**

Brain-based Learning and Teaching translates the complex research bases from educational psychology and neurological science into practical classroom applications. We asked three questions as we reviewed this book. First, does the information in this book reflect the known research in a clear and credible manner? Second, how does this book compare with standard textbooks used in typical educational psychology classes and/or special educational methods classes? And third, if we were to choose to use this book, how and where would we integrate it into our curriculum?

¹Alphabetical order of authorship indicates that both authors assumed equal responsibility for conceptualizing and writing this review. Requests for reprints should be addressed to Dr. Louette McGraw.

Eric Jensen, M. A., is a teacher who has applied accelerated learning and brain-based learning approaches to classrooms. Brain-based Learning and Teaching contains 23 chapters (with titles such as "Triune Brain Theory Implications," "Getting Attention & Keeping It," and "From Lesson Planning to Learning Planning"). Jensen includes a 28-page bibliography, reference materials, an appendix that cites organizations that focus on brain-based learning, and follow-up resources (such as workshops and seminars).

Jensen's latest book offers research summaries and practical advice for instructional implementation based on reviews of studies that span four decades, with an emphasis on work that has been published since 1980. We noticed that more than 500 references were cited in the bibliography: 88% published since 1980 and 11% published between 1959 and 1979. Readers familiar with brain-based literature will recognize many of the names of the researchers he cites (i.e., Reuven Feuerstein, Howard Gardener, and Georgi Lazanov). We noted, however, that there were not many experimental research articles cited, thus making it difficult to evaluate whether the books cited relied heavily on interpretation as distinguished from experimentation.

In this book, Jensen practices many of the techniques he recommends. For example, he uses mind-maps as "advance organizers" to visually and succinctly preview the content of each chapter. A "check for understanding" is placed at the end of each chapter. On

the other hand, Jensen tends to use lists, a technique for which he finds negative correlations for achievement! Finally, by citing specific resources and readings that can be researched, Jensen makes it possible for curious and more skeptical readers to come to their own conclusions about his knowledge claims.

Perhaps the most intriguing aspects of this book are the sections entitled "What This Means To You." After summarizing what a researcher has discovered, Jensen often enriches the text with a diagram, a table, or a chart to evoke the reader's visual memory. He then ends the section with specific examples that show teachers what they might "do" with this information.

Jensen has provided a valuable service to teachers by translating the often arcane language of educational researchers into a more accessible, conversational language. In doing so, however, it seems to us that some important information is missing. For example, Jensen does not include a critique of the research he summarizes, nor does he summarize how the studies are conducted. With this disclaimer in mind, it is often not possible to fully understand the value of the study being interpreted by Jensen. We are sometimes left with the feeling that the knowledge claims may be a little exaggerated. However, it should be noted that this lack of detailed analysis is found in other educational psychology textbooks, as well.

When comparing Jensen's text with other educational psychology textbooks, we found that Jensen's

chapter headings corresponded well. Most educational psychology textbooks have sections on motivation and learning, cognitive thinking, memory, and so on. The major difference between Jensen's book and standard educational psychology texts is the almost relentless focus on implications for practice. Many of the suggestions to teachers from motivational research, constructivist perspectives, even critical theory are emphasized. Jensen stresses the importance of novelty, emotion, context, choice, personal meaning construction, and the need for an environment free of threat and anxiety.

Some of his conclusions seem to go beyond the research available from educational psychology. For instance his conclusion that extrinsic reward strongly deters intrinsic motivation is not supported by a recent meta-analysis of this literature (Cameron & Pierce, 1994). Another instance of this tendency is the strong recommendation for graphic organizers. The research literature in this area again does not lend itself to such clear cut support for the benefits of maps, webs, and other models. The critical reader must ask the question whether these strong generalizations are warranted from the research evidence and whether these strong generalizations are correct interpretations of the research evidence.

Jensen's strategies for improving learning for students who are under-performing are well supported from many areas of educational research: choice, appropriate challenge, and complexity in assignments; giving

content personal meaning; using stories and metaphors to make content relevant; evoking positive emotions in the learning process; learning content with multiple modes; using diversity and variety in learning to reach students' differing learning styles; and using apprenticeships. We detect a redundancy in many of the chapters where the same implications for practice are made again and again. There is also some ambiguity: calling for group discussion to create meaning, but at the same time saying in chapter one that group learning needs to be minimized. In chapters four and eight different explanations of what attracts the brain can be confusing.

Some ideas that one of the reviewers (Dr. McGraw, an educational psychology professor who is a newcomer to accelerated learning information) found very innovative and supported by personal experience in trying to achieve conceptual change in undergraduate students include the following: suspense, surprise, disequilibrium, uncertainty, and disorder to achieve a richer, more powerful understanding of content. Jensen's suggestion that chaos and confusion may be one of the few ways to naturally trigger new learning seems to be corroborated. Another similarity is the idea that conceptual change cannot occur without the confrontation with our own perceptions, biases, and cultural blinders. It is interesting that this principle of conceptual change comes from two such diverse fields—brain-based pedagogical theory and a critical theory of pedagogy.

In contrast, the other reviewer (Dr. Nevin who

has been using various accelerated learning techniques in her special education methods classes since 1984) uses the technique of inviting students to experiment with the ideas presented in many of the chapters. This viewpoint has been helpful in encouraging special education teacher education candidates to break out of their current (often narrowly defined) paradigms of viewing learners as deficient. The chapter on "lesson learning versus lesson planning" is relevant: most special education lesson planning formats typically focus on what the teacher does.

In conclusion, we both firmly believe this book is valuable reading for teachers at any academic level who want to improve the level of learning for all their students. We agree that Jensen's book would complement the ideas presented in traditional educational psychology textbooks. Indeed, this book could help the novice as well as the veteran make more meaningful sense of educational psychology knowledge. We also look forward to a sequel to this book which might be devoted to stories about lessons in which these principles of learning are used.

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Accelerative Learning and The Emerging Science of Wholeness

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Abstract

As practitioners of the art and science of accelerative learning we are faced with some profound challenges: To be sure that our work is firmly grounded in research, to answer critics in an intelligent and convincing manner, and to continue to explore the edges of potentialities of the human mind and spirit.

In responding to these challenges, we find insights by noting parallels to the "new sciences." Both have roots in the study of the physical universe. Both reveal surprises about that universe and invite us to rethink previous belief systems. Both offer breakthrough suggestions on how we can dramatically expand, not only our learning and creativity, but also our consciousness of the human condition and our place in the universe.

*Turning and turning in the widening gyre
The falcon cannot hear the falconer;
Things fall apart; the centre cannot hold.
Mere anachy is loosed upon the world.
The blood-dimmed tide is loosed, and everywhere
The ceremony of innocence is drowned;
The best lack all conviction, while the worst
Are full of passionate intensity.
Surely some revelation is at hand;
Surely the Second Coming is at hand!*

"The Second Coming" W.B. Yeats

Accelerative learning experienced birth pangs approximately 30 years ago with the research of Dr. Georgi Lozanov and others. Its evolution through infancy and teenage years, to early adulthood was fraught with difficulties ranging from critics' honest skepticism to political repression to outright rejection among scientists and fanatics alike.

There seems to be greater acceptance now. But in the late 70's and early 80's teachers were taken to court and lost their jobs for practicing *suggestopedia*. They are in good company. Copernicus, Galileo, Darwin, and more recently, Ilya Prigogine, Karl Pribram, David Bohm, and many others share a similar story. But there are many anecdotes of mental turn-arounds; one favorite is that of the early French Academy which officially pronounced that it was patently impossible for such a thing as meteorites to exist--until one fell shortly afterwards and broke most of their windows.

Most people don't readily embrace change; it takes a long time for daring new ideas to gain acceptance with the general public. As we approach the 21st century, however, new paradigms are emerging in virtually every field: education, physics, mathematics, chemistry, biology, and neurophysiology. For the sake of brevity, these areas of study will be referred to as the "new sciences." Their proponents are eminent professionals exhaustively trained in their fields and respected by colleagues for precision and past contributions. However, their current descriptions of the universe are, frankly, revolutionary.

The work of Dr. Lozanov and Dr. Gateva, although carried out in virtual isolation due to the political situation in Bulgaria, parallels that of other "new scientists." Some of the basic shared premises are:

- a) All matter is interconnected.
- b) Rational, logical approaches to understanding the world are not always sufficient to comprehend its complexities; a global approach is generally more effective.
- c) The substrata of information below the level of consciousness plays an infinitely greater role than previously realized.
- d) Since the universe is flowing rather than static, some very surprising events can occur which go against our previous notion of logic.

In order to put the above into perspective, let us offer a very brief overview of scientific thought over the

past 300 years. In the West, our inheritance, based on the thinking of Newton and Descartes, is rational, mechanistic, essentially left-brained, and it worked well for us for centuries. In this classical way of viewing the world, all matter, including the brain/mind system, was thought to be comprehensible once it could be broken into composite pieces and analyzed. This system is very clean; it is still responsible for most of our thinking. Unfortunately, it neglects to account for consciousness, for accelerative learning, for many other phenomena reported by scientists and lay people worldwide.

At about the time Dr. Lozanov began his studies into the potential powers of the mind and came up with astounding results, others in a variety of fields were doing the same. And the pejorative descriptions commonly applied to quantum physicians were similar to those applied to suggestopedia: *absurd, impossible, bizarre, beyond belief*. Even Einstein once said that quantum theory reminded him of the "system of an exceedingly intelligent paranoic, concocted of incoherent elements of thought." Are these theoreticians crackpots? Or are they geniuses? If the latter is the case, then "surely a revelation is at hand."

Before we probe into the somewhat mind-boggling theories of people like Prigogine, Pribram, and Sheldrake, let us provide an example of the old and the new paradigms in a more familiar field: education. The world and its ensuing pedagogy, according to Newton, was linear, static, predictable. The world and its ensuing pedagogy, according to our renegade theoreticians, presents a strikingly different picture:

Assumptions of 19th and early 20th century paradigm of education	Assumptions of the new paradigm of education
a) Information given in small pieces, presented logically	a) Large amounts of information presented globally
b) Limited expectations of students	b) Realization that students can learn 3-5 times faster than previously believed
c) Emphasis on analytical, left-brain thinking	c) Whole-brain thinking
d) Concern with norms	d) Concern with the individual's performance, stressing limitless potential
e) Classroom designed for efficiency, convenience	e) Emphasis on aesthetics; inclusion of the arts, comfort, breath

Those of us in education can, doubtless, think of many other examples. We know the patterns well. The old assumptions were based on linearity, limited potential, and obedience to established norms. The new assumptions are based on a belief in the virtually limitless potentials of our minds and our creativity.

Let us observe how similar but even more dramatic changes in consciousness are encouraged by a new paradigm in chemistry. In 1977 Ilya Prigogine won the Nobel Prize for his theory of dissipative structures. Essentially it accounts for leaps to higher levels of complexity that occur throughout the universe. It answers a question that has confounded scientists for centuries:

Given the existence of entropy as a fact of living structures, how is it that the universe is not "running down" but in fact continues to create higher patterns and more complex levels of organization? This restructuring, this escaping to a higher order, occurs in fields as diverse as biology, chemistry, psychology, sociology, and education.

To understand this theory we need to recall that in the patterns of nature nothing is fixed. Everything is composed of particles that are in constant flow. Open systems (like seeds, certain chemical reactions, or the brain) are all dissipative structures; they maintain their form through a constant exchange of energy with the environment. They are highly organized but always in process. The more complex a system, the more it is interconnected in many ways and at many points, and the more vulnerable it is to internal fluctuations. When fluctuations in the energy levels are minimal, the system absorbs them and the basic structure is not affected. But when the fluctuations reach a critical size, they "perturb" the system. By increasing the number of new interactions, the pattern breaks up and reorganizes into a new, higher order.

The more complex a system, the more "unstable" it is; that is, the more likely it is that a large perturbation will upset the delicate balance of the system and it will restructure itself into a new order. The brain, of course, is a perfect example of a dissipative structure. It is the ultimate in complexity; it is in a constant state of flow and interaction with the environment; it is characterized

by abrupt shifts and sensitivity to perturbation. Brainwaves reflect fluctuations of energy, and in normal consciousness, beta waves dominate most people's EEG patterns. Psycho-relaxation tends to increase the slower, larger alpha and theta waves. Inward attention, in other words, generates a larger fluctuation in the brain. In a relaxed state, then, fluctuations can reach a critical level, large enough to provoke the shift into a higher level of organization. This is apparently when our students have the "Aha! I got it!" experiences. It is also the state where original, creative, intuitive *knowing* occurs.

What interests us *via a vis* suggestopedia is that learning shifts are often preceded by stress involving excitement, creative tension, even some confusion and anxiety. We know that crisis is essentially another facet of opportunity and that the creative process requires chaos before form emerges, thus a perturbation is essential for a dramatic shift or awakening to occur. This apparent contradiction (relaxation vs. stress) has been somewhat confusing to students of accelerative learning. However, we must keep in mind that only under the right circumstances does a perturbation lead to a new structuring. If the system is too "stable" (read fixed), the new information will not affect it. If there is too much stress, it could lead to a breakdown of the system. The solutions: 1) create a supportive environment as a fabric on which high content material, presented in a highly emotional manner can be safely introduced and 2) keep up a varied rhythm in the classroom, balancing relaxing with high energy activities.

At a Florence, Italy training in 1989 Dr. Lozanov said: "If there is not a huge amount of material being presented, this is not suggestopedia." Does this not sound like Prigogene's dissipative structure (perturbation of the system is required to move to a new level)? The crucial point here is that Prigogene's theory not only helps to explain why suggestopedia is so effective, but it also explains scientifically why suggestopedia is qualitatively different from traditional learning. It cannot be said that accelerative learning is simply doing more of what works, or adding new elements, or increasing the amount of information taken in. *Suggestology is of a different order!* It is the theory of the author that when we have equipment of sufficient power and subtlety to measure it, the brain will actually *look different* when suggestopedia is occurring. There will be more synaptic connections. Blocks, which are now believed to be more than merely ideas, but actually physical, observable dense protein matter, will be circumvented and many other measurable changes will be apparent.

Several new ideas emerged from Ilya Prigogene's transformative work. One is chaos theory which scientists say is more than just another theory. It is fundamentally a new approach to seeing, studying and interpreting the universe with far-reaching implications. It is a mathematical system to help explain non-linear structures, those which appear to be unpredictable and erratic, ie., the weather, clouds, rivers, the stock market, fibrillating hearts, in fact most systems in the universe (Goerner, 1994). Although predictable processes are involved, the outcomes are often unpredictable. But the

remarkable results are beginning to point to a universe that is precisely structured with a deep underlying unity even in areas that have previously appeared chaotic and random. This is the amazing world of fractals and strange attractors, patterns within patterns, and the possibility that it is dynamic relationship with the external world which gives rise to all form. On a purely subjective, metaphoric level, it is interesting to note the similarities between chaos theory and suggestopedia. In both cases there is a carefully ordered underlying plan. On the surface the form may appear to be interesting yet somewhat chaotic. However, when the observers have arrived at the point where they can see how all the pieces fit together, they can appreciate the beauty of the patterns involved, both in the art of the presentation and in the internal pattern of the materials being presented. In education chaos is often equated with fear. But we need to understand that chaos is natural and necessary. Without it, scientists say, there would be no order, no creativity.

The other element of chaos theory that is relevant to us is the concept that when dealing with non-linear systems, if you add A and B you get A plus B plus something extra, something unpredictable. The whole is greater than the sum of the parts. Trying to understand the universe by breaking it into bits is rather like trying to comprehend *King Lear* by putting a copy through a shredder and reading each minute fragment in isolation... or trying to teach people to communicate in a new language by analyzing class 3 stem-changes in irregular verbs. Unfortunately, however, in both the

educational and scientific communities it is this reductionist approach that usually still holds the power and the purse.

Let us now move from dissipative structures and chaos theory to another, equally mind-boggling discovery known as Bell's Theorem. It was proposed in 1964 by physicist J.S. Bell and experimentally confirmed in 1972 by Einstein. When the particles of a two-particle system (which are identical twins in polarity) are separated and the polarity of one is changed by an experimenter, the other changes *at the same precise nano-second*. They remain mysteriously connected. Later experiments found that identical twins separated at birth and unaware of each other's existence displayed uncanny similarities in tastes, personal decisions, life styles and wives! Apparently elements in the universe are connected, bonded, on both micro and macro-cosmic levels. This, too, corroborates Dr. Lozanov's belief in the importance of the suggestive link. Is it possible, perhaps, that when there is an emotional connection between members of a class, that entrainment (breathing, speaking, gesturing in union) might occur? This subtle but deep connection of teacher with students and the students with each other in a suggestopedic class may, indeed, be proven by science to play a much greater role in the efficacy of learning than previously believed.

A fourth area and a crux of quantum physics is the conundrum of wave vs. particle. It seems that not only does the basic *stuff* of existence turn out to be both wave and a particle (seemingly mutually contradictory

states), but that two facts can determine which aspect will reveal itself in a given moment. The first is simply that someone is watching, called the *observer effect*. The second is expectations or intentionality. As teachers we may not be too concerned about wave vs. particle. But look what intentionality can do:

William Tiller, a Stanford University science professor, reported in 1986 the results of an experiment in intention. He created a device that releases electrons when subjected to healing intent. Normally the device would emit a maximum of one burst of electrons every five minutes. When individuals intentionally focused healing energy through their hands more than 50,000 bursts were recorded. When they placed their hands around the device with no healing intention (focusing instead on mathematical calculations) no bursts were recorded. Later, Tiller added visualization, and after thousands of experiments, he concluded that there is an energy beyond the electromagnetic spectrum, emitted by humans, that can activate the release of electrons. This subtle energy, he hypothesized, can transfer information directed by the mind and focused by intention, attention, imagery, and love.

The fifth and sixth areas from the new sciences will be discussed together, since, combined, they provide insights that are more profound than when studied separately. Physicist David Bohm of the University of London talks about the universe in terms of implicate and explicate levels of reality (Bohm, 1991). Neuroscientist Karl Pribram of Stanford sees the brain as a holo-

gram interpreting a holographic universe (Talbot, 1991). While both of these scientists are highly respected in their fields, the theories they propose are rather abstract, esoteric, difficult to prove. Both men hasten to point out that theirs are working models and, as always in science, they will probably be altered or replaced as new information becomes available. In the meantime, they are thought-provoking and may provide additional insights into how suggestopedia works.

Briefly, the theories are that our brains mathematically construct "concrete" reality by interpreting frequencies from other realms of patterned primary reality that transcend time and space. In a state that Dr. Lozanov calls "vigilance," that relaxed alertness so necessary for accelerated learning to occur, students may actually be accessing the invisible matrix that generates "concrete" reality. This theory could account for all the phenomena that seem to contravene existing scientific "law" by demonstrating that such restrictions are themselves products of our perceptual constructs. Theoretical physics has already demonstrated that events cannot be described in mechanical terms at subatomic levels. Furthermore, creative thinkers and problem-solvers in fields as diverse as business, psychology, science, art, music, theology, mysticism, poetry, and everyday living have attested to receiving insights from "some other realm." And this has been reported for as long as human history has been recorded.

Holography is a method of lensless photography in which the wave field of light scattered by an object is

recorded on a plate as an interference pattern. Because there is not focusing lens, the plate appears as a meaningless pattern of swirls. However, when the photographic record--the hologram--is placed in a coherent light beam, often a laser, the original wave pattern is regenerated. A three dimensional image appears. *The fascinating fact is that any piece of the hologram will reconstruct the entire image.*

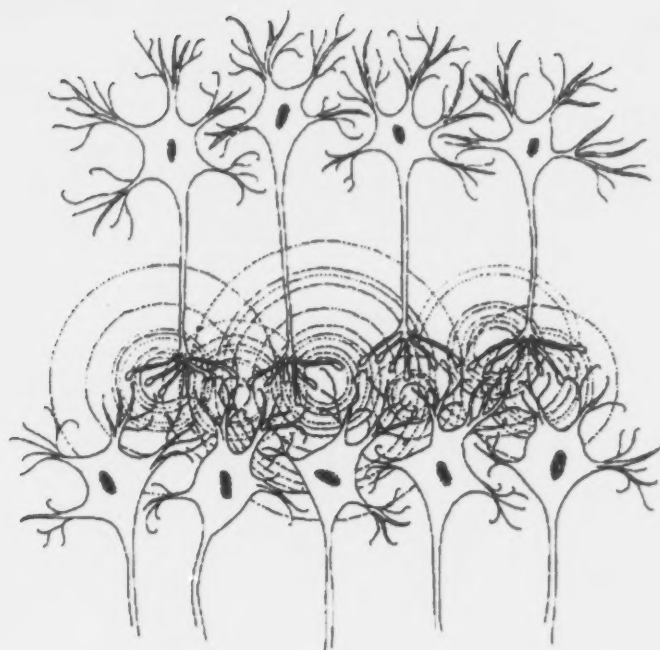
David Bohm says that the hologram is a starting point for a new description of reality: the *enfolded* order. Classical study of reality has focused primarily on secondary manifestations--the *unfolded* aspect of things, not their source. But these appearances are abstracted from an intangible, invisible flux that is not comprised of parts; it is an inseparable interconnectedness.

Bohm, like everyone else we have been discussing here, says that primary physical laws cannot be discovered by a science that attempts to break the world into parts. And Karl Pribram believes that the brain's "deep structure" is essentially holographic, analogous to the concept of holography for which Dennis Gabor won a Nobel Prize (Talbot, 1991.)

If, as it is believed, the brain structures see, hear, taste, smell, and touch by sophisticated mathematical analysis of temporal and spatial frequencies, then these mathematical devices may depend on interactions at the junctions between cells (synapses) via a network of fine fibers on the branching axons. Nerve impulses in this fine-fiber network manifest in slow waves with the

potential to carry out the mathematics. (Other researchers have speculated that the alpha brainwave rhythm may be a timing device necessary for the computation. However, Dr. Lozanov stated at his training in Florence, Italy, 1989, that his research indicates that an alpha state is not a prerequisite for accelerative learning. It may or may not be present and doesn't necessarily affect results.) Pribram has suggested that interference patterns are stored across the membrane of nerve synapses as permanent changes in their electrical sensitivity. In optical holography, literally thousands of holographic images can be recalled separately by illuminating a scene or some aspect of a scene like the one originally stored. In an analogous way, Pribram proposed, the brain-cell synapses could contain thousands of holographic images. This model could account for the phenomenon of association--how one image or experience or idea recalls another somewhat like it, how perception leads to thought to perception to thought in a stream of consciousness, an unfolding and constant refolding of holographically stored memory.

Please refer to the diagram on the next page from Looking glass universe, John Briggs & David Peat, 1984.



A fanciful picture of interfering wave fronts of electrical activity in the area of nerve synapses. Pribram believes that very subtle changes in electrical sensitivity in the area of the synapses store the holograms. A virtually infinite number of holograms could be stored together in these synapse areas all over the brain. The storage process may involve the constant flowing of electrical activity that takes place between synapses.

Most interestingly, Dr. Lozanov presents a model similar to the one above. The brain constructs are com-

pared to branches of a tree, and we are reminded to present information globally. If we were to diagram a suggestopedic lesson plan on this model, we would fill in the major branches first to give the students an overall picture. Traditionally, however, a teacher would start with the first branch, with all its outshoots, and methodically cover every detail, then review, then make sure, with a test, that students understood, and then finally go on to the next point. With a system that is so incompatible with the way the brain and the world function, it is no wonder that our education systems are less than effective. On the other hand, a presentation that initially touches on the major points, Lozanov tells us, calms the personality because the student can see the whole picture but doesn't have pressure to know and remember everything. Most importantly, neuronic traces are being formed so that the student will eventually fill in the details (the smaller branches), and the new knowledge will more naturally go into long-term memory.

And so we find parallels between the work of Pribram and Lozanov. Both researchers suggest that the hologram and the brain seem to have information distributed throughout the system., and both suggest that learning will be more efficient when access and recall are handled non-linearly.

One other rather eerie similarity between the findings of brain research and holography is that when one part is missing, another provides the information, although somewhat blurrily. Patients who have had a partial lobotomy surprised researchers with their ability

to produce information or skills that should have been lost, somehow "making up" for that storage area that was destroyed. Similarly, when a piece of a holographic photo is broken off, the whole picture can be seen in that piece, no matter how tiny it may be.

Apparently each fragment of the universe is encoded to produce information on the whole. The English poet William Blake definitely thought this to be true:

*To See a World in a grain of Sand,
And heaven in a Wild Flower,
Hold Infinity in the palm of your hand.
And Eternity in an Hour.*

William Blake "Auguries of Innocence"
English Romantic Poetry and Prose, 1956

After centuries of mutual mistrust, are we beginning to see the potential for romance among philosophers, poets, and scientists? Perhaps even a marriage, for most literary critics would read the above lines as a metaphor. Pribram, the penultimate scientist, suggests more boldly than the poets have dared that there may be no such thing as metaphor, or, more specifically, that all metaphor is true. *Everything is isomorphic.* (In Hermetic philosophy, "as above, so below".) We may now be experiencing the effects of a social hologram, a pattern of interconnectedness of individuals. And what are the implications for suggestology?

The following are anecdotal, and, therefore, not scientific. However, since we may soon have to rede-

fine what is scientific, and since they fit so well with implicate order and holographic theory, they may be of interest to the reader.

In 20 years of teaching Spanish suggestopedically, the author has observed/experienced the following:

- 1) Students will occasionally come out with a word or phrase that they swear they have never been exposed to before.

- 2) The sense of interconnectedness of teacher and class participants appears to be *the most* powerful element in achieving high results.

- 3) One of the precepts of accelerative learning to which most of our colleagues adhere is "the total result is greater than the sum of the elements that make up a suggestopedic class." But why is this? How, in a mechanical world, is this possible?

Finally, we must visit, albeit briefly, one more "cutting edge" theoretician who rejects reductionist approaches. Rupert Sheldrake's field is biology, and he is the author of the hypothesis of formative causation. Very succinctly, he proposes that the form, development, and behavior of living organisms are shaped and maintained by fields as yet unrecognized by any science (Sheldrake, 1981). These are labeled "morphogenetic fields" and are molded by the form and behavior of past organisms of the same species through direct connections across

both space and time through a process called "morphic resonance." In essence, he is saying that once something is learned by enough members of a species, the chances of other members learning it faster due to access to the morphogenetic field are vastly increased. According to Sheldrake, examples of learning through morphic resonance are the following: parallel inventions, the intuitive knowing of psychomotor skills such as tennis or drawing, the power of legends, myths, stories, and ritual, and the cumulative effect of an idea held by a number of individuals.

The jury is still in session on this one, but should this theory or some variant of it prove true, it would account for several beliefs of suggestology:

1) The concept of 'prestige' (learning something from someone of long-standing respect is likely to be more effective than learning it from just anyone). Is it possible that the prestige factor is also related to the fact that, since many people have learned from this person, or in this way, that a morphic resonance has been formed, and, as time goes on, it is more and more likely that the behaviors will be repeated? For example, the one-minute mile was once considered impossible, but once it was achieved, each succeeding achievement increased the possibility of its happening again. Similarly, it was once considered impossible to learn 3-5 times faster, but each time this is achieved, would it not make it more likely to be repeated in the future?

2) The use of classical music that has been appreciated by millions of people over time has been proven to be more effective than music that was composed yesterday. The same would be true of copies of classical pieces of art hanging in the classroom.

3) As teaching media, myths, stories, symbols, and rituals that have touched many peoples over centuries would affect students more powerfully than a translation of a current movie, for example. If this is true, then we need to be very careful in writing or selecting our dialogues or other class materials.

As we conclude, we must remind ourselves that the 'new sciences' and suggestology have offered to many people's (but certainly not everyone's) satisfaction viable alternatives to traditional ways of viewing the universe. We find that our renegade thinkers hold many elements in common: a belief in a non-linear, wholistic approach to understanding life, a sense of the interconnected nature of the universe, a rejection of the Newtonian belief that all can be understood through left-brained analysis, and, perhaps, a promise of a new world order. The honest seekers also realize that we have a long way to go and the insights of the past years are simply a beginning, an offer of hope, an invitation for more. As we strive to understand, not only the nature of learning, but the overall plan of the universe, we need to take into account the wisdom of the past, blend it with the knowledge of the present, and figure out a way to weave it with whatever the challenges the future may offer.

THE PAST: *Now I a fourfold vision see,
And a fourfold vision is given to me;
'Tis fourfold in my surpreme delight
And threefold in soft Beulah's night
And twofold Always. May God us keep
From Single vision and Newton's sleep.*
William Blake c. 1802
"With Happiness Stretched Across
the Hills"
English Romantic Poetry and Prose, 1956

To Blake, single vision was pure sensation such as scientists (Newton in particular) cultivate. Twofold vision added an intellectual appreciation of the object. Threefold infused the perception with an emotional value, and a fourfold vision crowned it with mystical insight as to its place in the universe.

Beulah, often represented as the moon, symbolizes a state of repose during which the mind is receptive to intellectual and spiritual suggestions.

THE PRESENT: *As a scientist I can say only that human potentials are greater than we know... personally I say they are unlimited.* Dr. Georgi Lozanov

THE FUTURE: As we approach the 21st century one thing is certain: The future is uncertain. Every field which attempts to understand life and the universe is discovering that "things fall apart, the centre cannot hold."

And this is why it is crucial for suggestology to become widespread everywhere that learning occurs.

For trying to understand the subtleties and complexities of the world with our old methods of learning would be like trying to perform high level computations with an abacus.

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Suggestopedia, Biofeedback and the Search for the Alpha State

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Introduction: The Search for Alpha

In the late 1960's and early 1970's, as is well known to JALT readers, a new and unique teaching method called Suggestopedia was developed at the Institute of Suggestology in Sofia, Bulgaria under the direction of Dr. Georgi Lozanov. The suggestopedic language class featured (and, indeed, still features) a relaxation session for unconscious assimilation of the lesson material. The original suggesto-pedic session was divided into two parts, active and passive, with each part comprising twenty minutes, the ideal meditation period in Yoga. During the active part, the teacher presented the appropriate foreign-language words or phrases with three different yogic intonations - declarative, whisper, loud command - while the students looked at the dialogue on the printed page and repeated

to themselves (using inner speech) the appropriate foreign words and phrases. (The Bulgarian translation of each word group was read first - quickly and in a monotone). During the passive or concert part, the teacher read the language dialogue a second time, but now in a soft, persuasive voice over a background of slow movements from baroque concerti grossi while the students, with eyes closed, visualized the text. (The slow movements used in the original concert, excerpted from the chamber music for violin and/or strings of Corelli, Handel, Bach, Vivaldi and Telemann, have, by definition, a rhythm of 60 beats to the minute, the ideal beat for meditation in Indian music). In the two parts of the session, the material was presented rhythmically on an eight-second cycle: two seconds - translation; four seconds - foreign-language phrase; two seconds - pause. The students were trained to breathe deeply and rhythmically in harmony with the teacher's voice and/or the baroque slow movements (Bancroft, 1994). According to its proponents, Suggestopedia contributed to a marked decrease in fatigue and tension, on the one hand, and a marked increase in memorization of language materials, on the other. The relaxation and improved memorization were said to be largely due to the "alpha state" - a state in which the body is relaxed but the mind is alert.

In Suggestology and Outlines of Suggestopedy, particularly in Chapter IV, "Towards a General Theory of Suggestion," Lozanov (1978) includes scattered references to electroencephalographic (or EEG) investigations, as well as pulse and blood pressure

measurements, of subjects under hypnosis, in a state of sleep, in the waking state and when executing yoga exercises. These investigations are linked to research into the subjects' "reserve [or learning] capacities" (p. 179). While details of brain wave research are not always provided, Lozanov gives the results of research conducted at the Institute of Suggestology: "it can be concluded that hypermnesia is not necessarily bound up with strenuous mental bioelectric activity and great strain. Hypermnesia can be achieved in states of concentrative pseudo-passiveness with an increased alpha rhythm" (p. 250).

At the Institute of Suggestology in the 1960's and 1970's, particular attention was paid to EEG (as well as pulse and blood pressure) investigations of suggestopedic students. In contrast to Western researchers, Lozanov investigated the use of "alpha biofeedback" with normal subjects and in an educational setting. In Chapter V of Suggestology and Outlines of Suggestopedy, there is a section entitled: "Suggestopedic Instruction and Cerebral Bioelectrical Activity" (pp. 232 ff). Attention at the Institute of Suggestology was focused on EEG analysis of students before the language class commenced, during class and before and after the special session for memorization of language materials. It was found that, following the special relaxation or concert session, alpha waves increased while there was a decrease in beta waves (p. 236). "The strongly marked increase in beta waves and reduction in alpha waves, typical of intensive mental work, were absent in the EEG of students during

suggestopedic instruction in a foreign language. The changes registered were typical of mental work of low intensity [. . .]" (p. 239). In addition, it was found that "the concert state was characterized by the alpha rhythm increasing over its level before classes [began], and the beta rhythm dropping under its initial level" (p. 239). In the Lozanov thesis, alpha is linked to the bringing into play of the students' reserve capacities and to improved memory and concentration. There is no discussion, however, of what causes the increase in alpha during the special session. It is the aim of this paper, through a discussion of biofeedback and brain waves (especially the alpha wave), to show that the original suggestopedic concert contained a number of the essential elements for producing the alpha state - a state considered necessary for improved memory and concentration by modern researchers such as Brian Morrissey (1996).

It seems likely that Georgi Lozanov was aware of research in brain wave biofeedback going on outside Bulgaria in the 1960's and 1970's; he was invited to California in 1971, for example, by Barbara Brown, the author of New Mind, New Body and Stress and the Art of Biofeedback. It is not possible to say with certainty that Lozanov was directly influenced by American research in his "brain wave" investigations; however, one can say that educators and researchers at the Institute of Suggestology in the 1960's and 1970's were in tune with this "modern" area of research: brain wave (and, in particular, alpha) biofeedback.

In the 1960's and 1970's, particularly in the United

States, a great deal of interest was expressed in research into biofeedback - said to be an ideal "drug-free" way of treating human illnesses because it made available information about biological activities to the individual concerned and evoked complex mental processes to change the body's physiological activities and to exert learned control over "involuntary" functions. The number of researchers burgeoned in a few years from less than 10 to more than 2,000 active investigators in the biofeedback field. (Early researchers included: Brown, Green, Mulholland, Kamiya, Budzynski, Murphy, Stoyva). In 1969 the Biofeedback Research Society was formed - renamed in 1976 the Biofeedback Society of America and in 1988 the Association of Applied Psycho-physiology and Biofeedback. Coinciding with movements in "pop" psychology, as well as Transpersonal Psychology, and "holistic" medicine, a social revolution and the "hippy" movement, an increasing interest in Transcendental Meditation and Eastern religions as well as in psychedelic drugs and dream consciousness and a renewed interest in hypnosis, brain wave biofeedback received great attention in the media in the late 1960's and early 1970's. Excitement was generated by the fact that brain-wave impulses, which elude our normal consciousness, are piped through EEG machine electrodes, amplified by delicate circuitry and finally translated into light, sound or some other medium that is accessible to the senses. Biofeedback and the EEG were said to be research strategies for exploring consciousness (or varying states of consciousness). The alpha brain wave, in particular, was linked to an altered state of consciousness - a new

state of mind, one that was stress-free, revelatory of mind/body harmony and in tune with ancient and mystic spirituality.

Articles in Tart's Altered States of Consciousness, which was first published in 1969, included studies of changes in brain functioning during the altered states of consciousness (ASC's) produced by the practice of Zen and Yoga. The adept practitioners of both Zen and Yoga showed almost continuous alpha waves (normally associated with a state of relaxed alertness in ordinary subjects) during meditation. In addition, Kamiya (1972) showed that ordinary subjects (but especially those with an interest in meditation, introspection, sensitivity training, good interpersonal relationships, dreaming, etc.) could be trained, by conventional operant techniques, to produce an EEG pattern similar to that found in meditating Zen monks and yogis, viz., almost continuous alpha rhythm. Coincident with the development of alpha biofeedback was the study of brain electrical activity as related to susceptibility to hypnosis. People with a fair amount of alpha in the EEG were found to be those who were most susceptible to hypnosis. Research studies conducted in the late 1960's reported that high susceptibles (i.e., those individuals who are very suggestible) produced more waking alpha density than nonsusceptibles (De Pascalis, 1989).

Subjects reported the high alpha state as being one of general pleasantness and relaxation. In the popular press, the mood state of a subject was said to

be changed by having the subject "turn on" his/her alpha. Once tuned into him (her) self, almost anyone, it appeared, could learn to identify specific brain wave states and, in short order, learn to control them. The possibility of not only controlling brain wave activity but also that of influencing subjective feelings associated with brain wave activity naturally elicited a wave of enthusiasm among behavioral scientists - not to mention members of the general public. The popularity of brain wave research nurtured a cult of the "alpha high"; the alpha experience was idealized as an intrinsic good. Experts in EEG reported interesting correlations between the state of emotional set and consciousness, on the one hand, and the amount of alpha waves generated by the subject, on the other (Basmajian, 1989, p. 3). Since alpha was said to be a principal brain wave correlate of meditation, there was an enthusiastic popular belief that alpha wave biofeedback was a "shortcut meditation technique" (Brown, 1974, p. 326). The potential of biofeedback techniques for regulation and modification of mind and consciousness was said to be "enormous" (Brown, 1977, p. 146).

The original enthusiasm generated by the development of brain wave biofeedback stemmed, in part, from the belief that it might provide a royal road to higher (or even mystical) states of awareness or consciousness. After an initial period of euphoria, however, alpha enhancement training with biofeedback became increasingly controversial. The growing suspicion that something was not quite right with the earlier studies culminated in a flurry of critical analyses.

These were directed both at the methodological inadequacies of the reported studies and their philosophical underpinnings. With respect to the latter, it was charged that much of the work, instead of being directed to a scientific understanding of alpha control, was using alpha enhancement as a pathway toward higher (or mystical) states of consciousness (Yates, 1980, p. 277). The alpha experience was said to be not simply due to alpha enhancement but to such factors as suggestion, expectations, initial bias and experimental setting. As reported in Yates (1980, p. 306), Plotkin stressed particularly the importance of suggestion and expectation in alpha experiments and the similarity of the situation created in many alpha studies to the situation created in sensory-deprivation experiments. Attacks were delivered on the "cult of alpha" and the "alpha culture."

While the "new (exciting) age" of mind/body harmony did not really come into being, alpha biofeedback did not really lead to teaching everyone how to feel happy and serene and biofeedback therapy (described initially as "unprecedented" and "limitless") did not prove to be the universal panacea for which researchers had hoped, biofeedback can make individuals aware that they must take responsibility for the maintenance and control of their own health and it has proved useful in the treatment of organic illnesses and psychological problems. Brain wave biofeedback has been used to treat subjects with social and psychological problems, as well as psychosomatic illnesses (such as insomnia and muscle tension) and

chronic pain - such as that associated with migraine and tension headaches, for example (Hutchison, 1994). Biofeedback, including alpha conditioning, has played a significant role in developing a methodology for helping epileptics to achieve better management of their seizure conditions (Lubar, 1989, pp. 84ff). Rehabilitation of physical function has been one of the major successes of biofeedback (Yates, 1980, p. 487); results of biofeedback training with disabled people have been "impressive" (Yates, 1980, p. 498).

Writing in the 1970's, Brown stated that one of the most constructive uses of biofeedback may be in education (Brown, 1974, p. 387). Biofeedback, she maintained, can be used in conjunction with teaching machines to alert the student to his/her optimal mind/body state for any given learning situation. Physical and mental attitudes more suitable for learning, as well as improvement of attention span by voluntary means, can be learned more readily via biofeedback.

Since the heyday of the 1960's and 1970's, biofeedback has been used for teaching in the classroom (Peper, 1979), to promote visual attention, to stimulate creativity, to induce a state of relaxed alertness. It has been used in education in conjunction with the reduction of stress levels and very often with those who have learning problems (Hutchison, 1994, chapter 30, "From Learning Disabilities to Learning Superabilities"). EEG biofeedback is used to work effectively with children who experience attention deficit disorder (ADD) and other disorders of behavior. This includes children who are

hyperkinetic and/or learning disabled (Lubar, 1989, p. 77; Hutchison, 1994). However, as can be seen from bibliographies in such books as Hutchison's Megabrain Power, most of the current research in biofeedback is in the health area: psychiatric illness, alcohol and drug addiction, epilepsy, stroke, phobias, memory impairment, stress reduction, etc. As Hutchison (1991, pp. 94 ff) points out, it is much easier to get funds to do research for medical and therapeutic purposes than it is to explore the possibilities of using mind devices on perfectly healthy people for the purpose of stimulating mental excellence.

In recent years, there has been a plethora of consumer- oriented EEG devices, many linked with computers and/or combined with sound and light stimulation. (For example, the CAP scan [Computerized Automated Psychophysiological scan] and the IBVA [Interactive Brainwave Visual Analyzer] combine recent breakthroughs in computers, computerized electroencephalography and biofeedback [Hutchison, 1991, p. 152; Morrissey, 1996]). In contrast to the 1970's, these "mind machines" are small, portable, more affordable and user-friendly (Hutchison, 1991). These devices can not only observe brain wave patterns but can also induce relaxation and alter brain wave patterns without lengthy training. While many new devices appear with exaggerated claims and personal testimonies, as opposed to solid research data (Hutchison, 1991, 1994; Ostrander and Schroeder, 1991, chapter 19), "mind machines" have proved to be (or have the potential to be) effective tools for

accelerated learning (Hutchison, 1991, 1994).

It is useful to reexamine the area of biofeedback (including brain wave biofeedback) as it relates not only to health in the sense of mind/body harmony but also to an ideal learning state (the state of relaxed alertness), one that was most definitely sought by suggestopedic researchers and educators at the Institute of Suggestology in the late 1960's and early 1970's and one which is crucial today if students are to be prepared for the challenges of the twenty-first century.

(Bio)Feedback

The term "feedback" is of relatively recent origin, coined by pioneers in the field around the beginning of this century. Mathematician Norbert Wiener, a founding father of research in feedback, concisely defined it as a "method of controlling a system by reinserting into it the results of its past performance" (Karlins and Andrews, 1972, p. 26). *Bio* feedback is simply a particular kind of feedback - feedback from different parts of our body such as the brain, the heart, the circulatory system, the different muscle groups, long believed to be outside the realm of conscious control. Biofeedback is essentially the return (the feeding back) of biological information to the person from whose body the information came.

Humans are regulated by two nervous systems: the voluntary and the involuntary. The voluntary, or somatic nervous system includes the nerve cells and fibers that serve the skeletal muscles. It is responsible

for all arm, leg and jaw movement, for changing posture - in short, for all movement that we normally regard as deliberate or "consciously controlled." The involuntary, or autonomic nervous system involves the eye pupils, heart, blood vessels, stomach, endocrine glands and all functions traditionally considered automatic or "beyond our control" (Karlins and Andrews, 1972, p. 34). Insofar as the brain is concerned, the very brain processes involved in patterned neural self-regulation are normally unobservable and not available to direct conscious experience (Schwartz, 1979, p. 57).

Biofeedback may be defined as the technique of using equipment (usually electronic) to reveal to human beings some of their internal physiological activities or functions, normal and abnormal, in the form of visual and auditory signals, in order to teach them to exert voluntary control over their own internal somatic activities or functions (such as heart rate, blood pressure, muscle tension, brain waves) by manipulating the displayed signals. Most instruments developed for biofeedback have been designed so that the individual undergoing biofeedback training can see or hear (or both) the monitor of his/her selected biological activity more or less continuously. This technique inserts a person's volition into the gap of an open feedback loop (hence the name biofeedback). Unlike conditioned responses, the animal involved, here necessarily a human being, must want voluntarily to change the signals in order to meet certain goals (Basmajian, 1989, p. 1). Biofeedback is "the process or technique for learning voluntary control over automatically, reflexly regulated body functions"

(Brown, 1977, p. 3).

To many researchers, the idea that individuals can learn to control a selected, unfelt internal body activity means that the individual can be "conditioned" to react in a specific way to a stimulus, i.e., to a signal containing the biofeedback information. In laboratory experiments and in some clinical applications, this approach to achieving "control" is brought about by giving the biofeedback signal every time the individual's physiological activity changes in a predetermined way. This process is called reinforcement and the signal is used to reinforce what the individual has learned. He (or she) is rewarded for having completed a performance, that of changing a selected physiological activity in a desired direction, and his/her brain mechanisms must now search for relationships between performing correctly and the biofeedback signal that led him/her to the correct performance. According to Brown (1977, p. 15), the only useful result of biofeedback training would be that kind of voluntary control over body activity that can be invoked *at will* and when necessary or appropriate or desirable. (This control is similar to that exerted by the Indian yogis who are able to regulate or dominate their inner beings by slowing the heart beat or controlling breathing in closed spaces, etc). With the exception of those suffering from severe behavioral disorders, the patient's (or subject's) training should reach a point where s/he can demonstrate control over the selected physiological function without the biofeedback signal.

According to Brown (1977, p. 146), "the ultimate biofeedback may well be brain wave biofeedback." Although the discovery was made (in the late 19th century) that electrical activity could be recorded from the cortex of the brain, it was not until the 1920's that Hans Berger discovered the existence of brain waves and showed a relationship between brain wave patterns and mental states. (It is somewhat difficult to point out exactly when the first operant conditioning studies of the EEG were carried out, although, since the 1940's, changes in the EEG have been believed to be associated with different states of consciousness). The remarkable contribution of biofeedback to brain/mind research is its ability to produce relatively "steady states" (Brown, 1977, p. 146). Once individuals learn voluntary control to sustain the presence of specific patterns or of specific elements of brain activity, such as alpha activity, the identification and precise definition of accompanying feeling states and mind activities becomes much easier. Brain wave biofeedback may be used for "disordered functions" or for producing, sustaining and controlling brain/mind states conducive to tranquillity and creativity. According to Brown (1977, p. 153), "EEG biofeedback has probably contributed more toward understanding the relationship between brain electrical activity and the products of brain activity labelled mental and emotional than any other prior scientific approach."

Brain electrical activity patterns are usually referred to as the EEG, the abbreviation of the recorded brain wave pattern called the electroencephalogram. (The electro-encephalograph is a device for recording

the electrical activity of the brain). EEG generally (or traditionally) implies the standard recording of brain electrical activity from eight or more electrodes or electrode pairs placed on the scalp according to a standard configuration. For each pair of electrodes the electroencephalogram has a channel of amplification and an ink-writing voltmeter that records on folding paper tape. Electrodes placed on the scalp pick up impulses that arise from the outermost area of the brain, the cerebral cortex. To record the electrical activity of deeper regions, needle electrodes can be surgically inserted into those specific areas.

What we know about brain electrical activity patterns is almost totally dependent upon the instruments used to record them. Since EEG patterns recorded from different scalp areas over the brain can vary remarkably, considerable care must be taken in interpreting both the research and clinical results of EEG biofeedback. Lester Fehmi's Brain Wave Biofeedback Synchronizer, for example, in contrast to devices which only monitor one or two of the brain's major lobes, is a multi-channel phase-sensitive biofeedback EEG, one that simultaneously monitors all the major lobes of the brain and signals when the user is in a state of whole-brain, in-phase synchrony (Hutchison, 1991, pp. 320-21). While traditional EEG's display only the frequency of the highest voltage they pick up on a specific location on the scalp, the Mind Mirror is said to take in, process and display the entire frequency spectrum in a logical and easily understood pattern (Hutchison, 1991, p. 175).

Throughout the history of EEG machines, attention has been focused on relatively slow brain waves and, for the most part, on those slow, very large components that are signs of brain pathology. (Most EEG machines dampen the amplitudes beginning at about 30 Hz. [cycles per second] and eliminate all brain electrical activity occurring above frequencies of 50 or 60 Hz.) The rationale for limiting EEG recording to slow brain wave frequencies has been mainly the inability of recording pens to reproduce high frequencies, the impossibility of electronic circuitry to discriminate very low voltage, fast EEG activity, and the apparently relatively greater importance of the slow, high voltage waves for human activity.

Brain Waves

Insofar as brain waves are concerned, it is mainly the rhythmic waves that have been labelled: beta, alpha, theta and delta. (Hans Berger, the pioneer of brain wave study, discovered alpha in 1929. The main thrust of clinical and experimental studies with the electroencephalogram [EEG] has been in the area of operant control of brain wave activity, with particular emphasis on the production and control of alpha rhythm). When people are aroused and/or focus attention on the outside world or external events, they usually produce only beta frequencies. If they close their eyes and think of nothing in particular, they generally produce a mixture of alpha and beta. If they become drowsy and slip toward sleep, theta frequencies often appear and there is less evidence of alpha and beta. Delta waves are not

normally present except in deep sleep. In approximate terms, delta waves are 1 to 4 Hz; theta are 4 to 8 Hz; alpha are 8 to 13 Hz. (or cycles per second). "Beta" is generally used to indicate all EEG activity of (assumed) frequencies higher than that of alpha. As the term is used by different investigators, it can refer to rhythmic or nonrhythmic EEG activity and to different frequency ranges (e.g., 13 to 28 or 28 to 40 Hz). In general, beta activity is quite low voltage and because of this and its close relationship to the characteristics of electrical noise in frequency and voltage, it is difficult to quantify precisely. Technically speaking, beta is not a smooth rhythm, but "a flurry of electrical static" (Karlins and Andrews, 1972, p. 73).

Brain wave activity is said to be related to behavior. It is generally accepted that beta activity accompanies alert behavior, information processing and concentrated mental activity such as that involved in solving problems in mathematics. High beta activity is associated with complex cognitive tasks and is correlated with attentional or memory processes; lower beta activity is associated with anxious emotions. Beta descriptors, which have both positive and negative aspects, include: active, alert, anxious, energetic, excited, exhilarated, lively, restless, stimulated and tense (Lubar, 1989, p. 76).

Theta activity, which is slower than alpha, can be recorded from many portions of the cortex or from the cerebrum in both awake and sleeping individuals. On the average, theta waves are about one-half the

frequency of alpha waves. They are sparse in the normal waking EEG pattern and are found most frequently during drowsiness and dreaming. Theta production is generally possible only with the eyes closed. However, theta activity can occur during alert behavior, generally sporadically, and can appear at moments of sudden insight or recognition of events in memory. Theta is often associated with day-dreaming or reverie and vivid visualizations and hypnogogic imagery. Delta waves, which have a lower frequency range, occur almost exclusively during the deeper stages of sleep and usually appear as single waves. Theta and delta thus represent slower rates of cortical synchronization than alpha. "Physically, the trip from beta to delta is a rhythmic unwinding; psychologically it is experienced as a quieting of the mind" (Karlins and Andrews, 1972, p. 74).

The Alpha Wave

According to the terminology committee of the International Federation for Electroencephalography and Clinical Neurophysiology, the official definition of alpha rhythm is: "rhythm, usually with a frequency 8-13 c/sec in adults, most prominent in the posterior areas, present most markedly when eyes are closed, and attenuated during attention, especially visual" (Lynch and Paskewitz, 1979, pp. 326-27). The alpha wave is not the most dominant, largest or most prevalent brain wave but it does have the distinction of being discovered first (by Hans Berger in the 1920's, as mentioned above) and of being the most studied. Alpha appears to be a slowing down of electrical discord into a pulsating hum

which sweeps regularly over the brain cortex, usually from front to back. The alpha rhythm is a rhythmic spindle (between 8 and 13 Hz., as mentioned) which can be recorded best from the posterior portion of the human or cerebral cortex. (It is important for practitioners using biofeedback for altering EEG activity to realize that the EEG recorded with scalp electrodes in humans are the tip of an iceberg [Lubar, 1989, p. 68]). According to Brown (1974, p. 313), one of the reasons why the most easily observed aspect of brain activity appears to be the alpha rhythm is that EEG recordings are generally done under conditions of relaxation. (A reclining chair is said to be a useful item of equipment. Many patients prefer to have the chair tilted to a semi-reclining position [about 45 degrees from the vertical] so that they have a good head rest [Stoyva, 1989, p. 174]).

Although alpha is defined as rhythmic EEG activity having a frequency of somewhere between 8 and 13 Hz., alpha frequency varies from person to person and it varies in the same individual depending on a number of factors, such as level of attention, state of consciousness, mood, etc. Researchers have divided subjects as follows: 1) those with no alpha, even with eyes closed and their mind at rest; 2) those with alpha only with their eyes closed and their mind at rest; 3) those with alpha present even with their eyes open and their mind active (Lynch and Paskewitz, 1979, pp. 328-29). The exact characteristics of alpha activity can also differ depending on the location of the scalp recording electrodes. Frequently alpha in the frontal and pre-

central areas can differ remarkably from that found in the mid-scalp or occipital regions. Not only are there a host of different kinds of alpha, but there are many influences that affect what is seen on the EEG record. Just to name a few: the type of electrodes and their placement, the type of recording device, skull thickness, electrical environmental noise, genetic factors, personality, intelligence, conditions of stress and the individual's mode of reacting to stress, endocrine factors, physiological drives such as hunger and fatigue, attention, motivation, the amount of information the individual has about his (or her) brain waves, body and his/her task (Brown, 1974, p. 318).

The behavioral state most closely identified with alpha activity is relaxed wakefulness (i.e., an alert but relaxed state). This implies that the brain state is a receptive one, and that it is not actively engaged in any specific mental or emotional activity. Alpha also appears when attention is focused inwardly. Alpha activity can be present, however, during certain kinds of alertness and attention, if the stimulus is not truly novel (Brown, 1974, p. 323) or when a particular mental activity is habitual. It is reported by Brown (1977, p. 150) that Einstein maintained an EEG pattern with considerable alpha while solving moderately complex mathematical problems, but that, when he was confronted with a new kind of problem, his alpha disappeared. According to Rosenboom (1976, pp. 12-13), during periods of repetition or reproduction of highly rehearsed patterns, one observes associated increases in alpha in musicians. It is possible that the "production of alpha

by a performing musician is related to his [her] ability to concentrate on the internal state, and, through disciplined practice, disengage him [her] self from the need to perform physical orientation in order to produce the 'right' notes or music."

Alpha tends to disappear during mental work, alerting, orienting, dreaming, hunger, visual activity, emotional arousal and frustration. One of the first reported characteristics of the alpha rhythm was the fact that it would block when the subject was presented with any of a variety of sensory or attentional stimuli (Lynch and Paskewitz, 1979, p. 326). On the other hand, "alpha activity occurs in the feedback situation when an individual ceases to pay attention to any of a number of stimuli which normally block this activity" (Lynch and Paskewitz, 1979, p. 335). These stimuli may be cognitive, somatic, emotional, etc. In addition to the feedback process, any other process by which these influences may be removed (as in the original passive or concert session in Suggestopedia) will result in increased alpha activity.

Reports of biofeedback studies continue to support neurophysiologically derived notions that the subjective feeling state during the presence of alpha activity in the EEG is a generally tranquil, comfortable, relaxed, pleasant feeling, although there may be occasional exceptions. (Alpha descriptors include: at ease, calm, composed, passive-like, peaceful, placid, relaxed, tranquil, uncritical and unfocused [Lubar, 1989, p. 76]). Some people report the flow of considerable

imagery, almost a day-dreaming reverie. (Kamiya [1979], on the other hand, found that the presence of alpha was reported as being associated with less visual imagery). Subjects in the "alpha feedback" situation often report dissociative phenomena such as feelings of floating, being unaware of the immediate environment and distorted time perception (Lynch and Paskewitz, 1979, p. 333). The fact that, in general, the presence of alpha activity in the EEG and the absence of beta activity indicates a mental-emotional state of relaxed wakefulness is almost reason enough to suggest its use in individuals who complain of anxiety and tension and whose EEG shows an abnormally low content of alpha (Brown, 1977, p. 153). Certain investigators feel that alpha biofeedback is appropriate as a stress-reduction measure, particularly for emotional stress (Brown, 1977, p. 187). One chief objective of alpha training is that, by learning to turn the attention inwardly, the subject naturally decreases the visual input of anxiety-related information (Brown, 1977, p. 240). Alpha's association with relaxed wakefulness is useful not only in therapy or self-exploration but also in stress-free learning. Alpha is ideal for learning new information, data, facts, material that one wants to be fully aware of and have readily available in waking consciousness (Hutchison, 1994, p. 211).

Concepts such as turning the attention inward, passive concentration, relaxing physically, not trying, emptying the mind (as in certain forms of meditation), encouraging the subject to invent mental strategies, are all useful for promoting alpha (Brown, 1977, p. 241).

Alpha will sometimes increase to a marked extent in subjects who are just sitting quietly in a comfortable chair. Closed eyes or, if eyes are open, an environment with subdued lighting (or a dark room), as well as a state of (induced) relaxation are conditions in which alpha production is normally maximal and the individual bursts of alpha are frequent (Brown, 1977, p. 171). The average human being exhibits alpha activity (which is only a relatively small part of the brain's electrical components manifest in the EEG pattern) only between one and perhaps 20 percent of the time when the eyes are open, and anywhere from 35 to 75 percent of the time when the eyes are closed; alpha rarely occupies more than 50 percent of the total EEG activity (Brown, 1977, p. 234). According to Brown (1977, pp. 238-39), "it is a simple fact that alpha becomes maximal in amount when the eyes are closed."

Alpha may also appear when the eyes are open. Move the eyes (i.e., the eye muscles) up and alpha appears; move them down and it disappears. Biofeedback researchers have tended to limit their recordings and feedback signals to the occipital scalp areas that overlie the interpretive visual cortex area, presumably because of the eye-alpha relationship (Brown, 1974, p. 328). Alpha waves can be made to appear when the eyes are open if attention is turned inward, away from the outside world, if one learns to "observe without looking" (Green et al., 1979, p. 128). In contrast, studies have shown that the greater the complexity of the visual input, the stronger is the alpha blocking response. According to Rosenboom (1976, p.

12), listening to or performing "stable, non-moving musical drones" (i.e., repetitious, monotonous-sounding music) is almost always accompanied by the presence of "more than normal alpha." (Participation in a "drone sound" usually involves a kind of meditation which seems "logically connected" to the alpha state). It appears, however, that some type of "optimal level of arousal" exists for the occurrence of alpha activity. While, if the subject is too aroused, alpha activity will be diminished, if the subject becomes too drowsy, alpha will also be diminished (Lynch and Paskewitz, 1979, p. 330).

The Suggestopedic Concert Session and Alpha

It can be seen, from an examination of the North American research on alpha bio-feedback and the original version of Suggestopedia, that a number of the essential elements for producing the alpha state were an intrinsic part of the original suggesto-pedic language class - especially of the original passive (or concert) session. During this session, as mentioned above, the teacher read the language dialogue in a soft, soothing and persuasive voice over a background of slow movements from baroque chamber music while the students relaxed in their chairs and breathed rhythmically and deeply in time to the rhythm of the music and the teacher's voice. The original suggestopedic concert session incorporated physical and mental (or psychological) relaxation: a relaxed posture and inner concentration or visualization (i.e., inward focusing).

Students' eyes were closed during the original passive session and they sat quietly in special chairs with a 45 degree angle and a head rest. The language materials for memorization were read over a background of slow-moving, repetitious and monotonous-sounding music. Students were told not to pay direct attention to the language materials being read but just to relax and listen to the music. Lighting was subdued in the classroom and the classroom atmosphere was calm and pleasant. Indeed, it was probably because of the "alpha state" that students were able to memorize large amounts of language material effortlessly - often, it was claimed, to levels of hypermnesia.

Since the new "mind machines" (Hutchison, 1991) can be used to get students quickly and easily into the alpha state, what is needed, according to Morrissey (1996), is a fully computer- automated accelerated learning classroom where participants develop control over their brain wave activity through biofeedback training and where brain wave states can be changed at desired moments in the teaching/learning cycle and the appropriate state prolonged, once it has been induced. Morrissey believes that tomorrow's classroom will be brain wave driven; teaching methods, styles, materials and the like will be determined by the brain wave activity of the learners. Brain wave technology equips educators with the means for detecting and/or confirming suggestive effects in the classroom through the collection and utilization of scientific data (Morrissey, 1996, p. 59).

In contrast to most other researchers in accelerated learning who subjectively evaluate their students' learning state, Morrissey (1996) is of the opinion that it is very important to reproduce the brain wave patterns which were operational during the original suggestopedic class and to verify these objectively with the appropriate equipment. With his system, called brainwave biotek, he shows that we can scientifically demonstrate and provide feedback of the effects which various suggestive means (dimmed lights, concert readings, use of special music, etc.) as well as various teaching strategies (games, songs, readings, etc.) have on students' EEG's and determine what effect those EEG's are having on intellectual performance and achievement (Morrissey, 1996). His research using the computer-based (and wireless) Interactive Brainwave Visual Analyzer (IBVA) shows that concentration, memory recall and classroom learning will be optimized if the instructor alternates cyclically between inputting information (especially during the concert session) with students maximizing alpha and their activating and elaborating upon the information while maximizing beta. However, as Morrissey (1996, pp. 52-53) admits, more research is needed in such areas as memory expansion and long term retention of materials. In his foreword to Morrissey's Ultimate Learning States, Donald Schuster says: "Exciting possibilities exist. Can we at last duplicate Lozanov's stimulating report of hypermnnesia (extraordinary memory)? Can we repeat it on demand and specify its conditions? Can we train classroom teachers to use it in public education? Potentially these questions can be answered affirmatively, but it's up to us as researchers and educators to get busy doing the research."

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Sources of reference information on accelerated learning

The easiest access to published information on accelerative (-ed) learning, SALT, suggestopedia, and Super Learning is through the ERIC system available in many university and college libraries. Secondary sources are *Dissertation Abstracts* and *Psychological Abstracts* along with the periodic author and topic indices of the *Journal of Accelerative Learning and Teaching*. Chapter 3 of *Suggestive Accelerative Learning Techniques* (1986) by Schuster and Gritton [University of Toronto Press] has an extensive review of the literature then available.

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Computerized Slideshows: A Modern Extension of Accelerated Learning Techniques

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Abstract

Two experiments were conducted to test the effectiveness of using computerized slideshows with accelerated learning techniques. Two separate cohorts of students were exposed to computerized slideshows played to music specially selected and sequenced for accelerated learning purposes. Afterwards, the experimental subjects were asked to complete an open-ended extra credit exam on the material contained in the slideshows. Those who saw the slideshows recalled significantly more information than subjects who instead read the material. The increases were found using both a stan-

dard accelerated learning approach and an approach that is more compatible with WWW-based and distance learning techniques.

Computerized Slideshows: A Modern Extension of Accelerated Learning Techniques

Accelerated learning (AL) enables students to learn more information through less effort. Originally pioneered for use in teaching foreign languages, the method has been expanded and used to teach in a variety of academic and business settings. Accelerated learning can be traced to the work by Georgi Lozanov (1978), who found that learners more readily internalize teaching-oriented suggestions while listening to soft music in a relaxed environment.

More than simply the "Mozart effect," accelerated learning embodies concepts already linked to improved teaching, including the creation of a relaxed learning environment that is visually stimulating (e.g., through the use of posters and other objects) and one in which students' achievement and satisfaction with their learning experience are paramount. Accelerated learning addresses the whole student by recognizing the different learning styles utilized by individual students (e.g., Sandhu, Fong & Rigney, 1996) and through acknowledging the role of self-esteem in learning (e.g., Vos-Groenendal, 1991). In addition to improved self-

esteem and satisfaction, learning increases of 20% to 300% have been linked to accelerated learning techniques (e.g., Morrissey, 1996, p. 93).

Forming the basis of accelerated learning are active and receptive concerts in which the subject material is first presented to the students and then reinforced in their memories. Music plays an important role during both events, as it plays softly in the background while the teacher presents the course material during the active concert and wholly forms the receptive concert. When properly used, music creates within the student an environment that is conducive to learning. The importance of music in learning has been the subject of other research. Frances Rauscher and colleagues (Rauscher, Shaw and Ky, 1993; 1995) found that listening to Mozart enhanced college students' spatial reasoning capabilities, if only for a short time following their hearing the selected sonata. Findings from a later study (Rauscher, Shaw, Levine, Wright, Dennis, and Newcomb, 1997) suggested that training students to play a musical instrument increases the duration of their improved spatial reasoning capabilities. In all three studies, however, music was linked to superior performance.

This article presents the findings from two experiments extending the accelerated learning paradigm to computerized slideshows. In both experiments, students who were exposed to the accelerated learning techniques recalled significantly more information than those who were not. The protocol and findings are presented in detail for each of the two experiments.

Experiment One: Standard Accelerated Learning Approach using Computerized Slideshows

Methods

The participants were 31 undergraduates in a lower division criminal justice course on the American Courts System.¹ The majority (55%, n=17) were female. Approximately three-fourths (77%, n=24) of the participants were white, 19% (n=6) were black, and one was hispanic. Most were upper division students; 13% (n=4) were freshmen, 32% (n=10) were sophomores, 26% (n=8) were juniors, and 29% (n=9) were seniors.

The experimental treatment consisted of exposure to a computer generated slideshow based on the accelerated learning (AL) technique. When the participants entered the classroom, they were told that AL can help them learn quicker and easier, and that it has been linked to increased memory performance. They were asked to put away their pencils and notepads, relax, and listen to four Vivaldi flute and orchestral selections specially sequenced by Barzakov (1987) that played in the background.

After a few minutes of relaxation, the participants were told that they would be seeing a 46-slide slideshow on nine problems facing the lower courts. The slideshow began with nine images (each depicting visually one of the problems), then presented those images coupled with complete sentences of text, and then concluded with the same nine images from the beginning of the show.² Although there was a great deal of material, the participants were told not to take any notes, but instead

to relax and "take in the slides to the music." They were told that all students in the class, regardless of attendance at the slideshow, would receive a take-home copy of the text appearing on the slides. The take-home sheet was identical to the slideshow, except that it lacked the visual images and, of course, the AL-inspired music in the background.

At this point, the music was changed to a music specifically selected for active concerts (e.g., Pachelbel's Canon in D Major, from Barzakov, 1987). The slideshow was shown twice. After the slideshow, the music continued for ten minutes for the receptive concert, during which the participants were directed to "rest and listen to the music, reflecting gently upon what we have just learned. Try to hear or visualize the text as you relax."

The activations stage took place during the next class meeting, two days after the active and receptive concerts.³ The instructor played with the participants a game devised to review what they learned in a "fun and deliberately childlike environment." The participants were told that there were no mistakes, that errors would actually show that they wanted to learn the material and were pushing toward that goal. The instructor read an open-ended question from a sheet while simultaneously tossing a leather bag to a participant. The participants were to blurt out the answers as they caught the bag. Those who did not know the answer to a question were directed to say one thing they remembered about the slideshow. Every participant, regardless of the answer provided, was to take from inside the bag a prize

(pencils and keychains with the university logo, coupons for free coffee at the campus cafe, postcards of the campus, and other assorted trinkets). Needless to say, the bag was welcomed by each participant.⁴ As there were 57 questions on the game sheet, the participants were asked questions at two instances. The only drawback to the bag tossing game was the instructor's inability to accurately throw the bag to those in the back row, resulting in some temporary "layovers" in the middle rows.

One week after the slideshow, the participants were surprised with a 55-question "extra-credit" exam. The participants were told that the number of extra-credit points they received would be based on the number of correct answers they provided on the exam.⁵ The first question (worth nine points) appeared on the first test sheet and asked the participants to list the nine problems facing the lower courts. Once this sheet had been completed, each participant was given the remainder of the test. This was done to prevent the participants from basing their answers to the first question on the wording of the later questions. All but five of the questions on the test were open-ended; some asked for specific numbers (e.g., "Most Colorado municipal court budgets in 1975 were less than what amount?"), while most asked for qualitative information (e.g., "How can part-time judges encounter conflict of interest?"). The answers appeared both on the take-home sheet provided to all the students and in the slideshow.

In all, 17 participants completed both days of

activities, three saw only the slideshow, eight participated only in the activations stage,⁶ and three were present for neither stage.⁷ Due to this distribution, two sets of analyses were completed. The first compared all those participants who had seen the slideshow to all those who did not.

The second set of analyses was intended to compare those who attended both days of activities to those who attended neither, but eight of the intended control group members showed up for the activations stage, leaving only three individuals who attended neither day. Instead, the analyses compared the four groups (i.e., those who attended both days, just the first day, just the second day, or neither day) to one another.

The outcome variables

There were a total of five dependent variables in this study. The primary outcome variable was a participant's total score on the test. Items were scored using a three prong scale: 0 = totally incorrect, 1/2 = partially correct, 1 = totally correct. The partially correct option was used for answers that "hinted" at the correct answer or were only part of a correct answer. The option was used to approximate actual grading practices used by many instructors. An example of a partially correct answer was "they don't like them" to a question regarding how some lower court judges view due process rules whereas totally correct answers included as "obstacles," "too constricting," or "burdensome." Due to their less complete or vague nature, partially correct answers could be interpreted by a grader

as incorrect. In the example above, for example, the partially correct answer does not state what the judges did not "like" about the due process rules. While there were 55 possible points on the test, the highest score was 51.5 points and the lowest was 21 points.

The second dependent variable was the participant's score on the recall of the nine-item list. The answers were coded as above for the total score. Forty percent (n=13) of the participants received perfect scores on this portion of the test. The lowest score was 3.5 out of 9 points.

The final three outcome measures were the actual number of questions a participant provided that fell within each category: totally correct, partially correct, and incorrect. Table 1 presents a summary of all of the outcome measures.

Table 1: Summary of the five dependent variables

Variable	Average	Std Dev	Minimum	Maximum	N
total score	36.90	9.35	21.00	51.50	30
recall score	7.44	1.79	3.50	9.00	31
# correct	23.40	6.91	12.00	35.00	30
# partial	3.73	1.62	1.00	8.00	30
# incorrect	10.87	7.09	.00	24.00	30

Comparison of those who viewed the slideshow to those who did not

As expected, those who had seen the slideshow performed better than the control group who did not. Those who viewed the slideshow received significantly

higher total scores on average (40.6 versus 30.5, $t=-3.44$, $p<.01$) and recalled significantly more items on the nine-item list (8.1 versus 6.3, $t=-2.61$, $p<.05$) than those who received only the printout of the information contained on the slides. Further analyses revealed that the differences in scores were attributed to participants providing totally correct answers rather than differences in points due to skillful use of partial credit responses. In fact, the two groups performed nearly equally on partial credit answers (3.73 versus 3.74, $t=-.02$, n.s.). It appears, then, that exposure to the AL-inspired slideshow consistently increased the participants' abilities to provide correct answers on demand rather than simply improve their abilities to accumulate points through answers for which they would be given at least partial credit. See Table 2 for these comparisons.

Table 2: Comparisons of slideshow viewers to control group for five outcomes

Outcome measure	Slideshow Viewers: mean (std dev) (n=20)	Control Group: mean (std dev) (n=11)	t score, prob.
total score	40.63 (8.348)	30.45 (7.468)	-3.44, .002
recall score	8.05 (1.404)	6.32 (1.940)	-2.61, .019
# correct	26.00 (6.218)	18.91 (5.804)	-3.14, .005
# partial	3.74 (1.759)	3.73 (1.421)	-.02, .987
# incorrect	15.34 (6.104)	8.26 (6.384)	3.02, .006

The multivariate analyses controlled for the participants' prior performance in the course. This measure, each participants' class average on the three prior exams,⁸ was intended to serve as a proxy for their general academic abilities, which could easily confound any results. In actuality, however, the average prior performance of the two groups was quite similar (79% versus 76%, $t = -.84$, n.s.).

ANOVAs comparing those who saw the slideshow to those who did not showed main effects for experimental condition (those who saw the slideshow received higher total scores, $F = 10.976$, $p < .01$) in addition to the significant effects of prior performance as a covariate ($F = 15.807$, $p < .0001$). An ANOVA on the participants' recall of the nine-item list yielded similar results; slideshow viewers recalled significantly more items ($F = 7.425$, $p < .05$) in addition to the effects of prior performance ($F = 16.273$, $p < .0001$). These two findings show that prior performance contributed to, but did not explain away, the differences in total scores and recall ability.

Split level analysis of the effects of the slideshow on "marginal" versus "better" students

This analysis first examined only those 14 participants whose average prior performance was a 'C' or less (79% or lower). These participants were considered "marginal" due to the ease with which they could fail the course based on their test grades. Viewing the slideshow significantly increased the total scores received by these participants. In fact, the increases were

slightly greater for the marginal participants than for the participants as a whole. On average, those who viewed the slideshow received total scores of 36.0, compared to 26.4 for the control group ($t=-2.67$, $p<.05$). In addition, the marginal participants who viewed the slideshow recalled an average of two additional items from the nine-item list (7.4 versus 5.2, $t=-2.90$, $p<.05$).

For those 16 participants whose average prior performance was a 'B' or better (80% or higher), it was found that viewing the slideshow was significantly associated with an increase of nine points in the participants' total scores (44.6 versus 33.9, $t=-2.99$, $p<.05$). Possibly due to a ceiling effect, however, there were no significant gains in recall associated with viewing the slideshow (8.6 versus 7.3, $t=-1.53$, n.s.). These comparisons appear in Table 3.

Table 3: Comparison of effects of watching the slideshow on "marginal" versus "better" students

	marginal students (<i>'C'</i> or less) ($n=14$)	better students (<i>'B'</i> or better) ($n=16$)
TOTAL SCORE:		
no slideshow	26.4	33.9
saw slideshow	36.0	44.6
RECALL SCORE:		
no slideshow	5.2	7.3
saw slideshow	7.4	8.6

Comparison of the four groups of participants

In order to compare the four groups of participants (i.e., slideshow only, activations stage only, both stages, and neither stage), a one-way analysis of variance was run with a Scheffe's test to discriminate between the groups.

As expected, those who attended both stages scored higher than any of the other three groups on the recall tasks, but the only significant difference was between those who attended both stages and those who attended the activations stage without first viewing the slideshow. Similarly, those who attended both stages recalled more correct information on the post-test than the other three groups, but the only significant difference was between the participants who attended the activations stage but not the slideshow, and those who attended both stages. Due to the low n's in two of the groups, these results must be interpreted with caution. The comparisons appear in Table 4.

Table 4: Comparison of the averages on two outcome measures for the four groups of participants

Outcome measure	Group 1: neither stage (n=3)	Group 2: Slideshow only (n=3)	Group 3: Activations only (n=8)	Group 4: both stages (n=17)
total score	34.00	31.00	29.13	42.44
recall score	6.67	6.67	6.19	8.29

Qualitative analysis

At the end of the extra-credit final were two open-ended questions that asked for the participants' feelings about each of the two stages of the experiment (i.e., "how did you like the slideshow on day 1?" and "How did you like the ball tossing game on day 2?"). The participants were told that their answers would play no role in the points they received on the extra-credit final or in their ultimate grades. Every participant provided at least one comment on the stages they had experienced.

No participant had a negative comment about the slideshow. Instead, many (n=5 marginal students, n=7 better students) felt it helped them to learn the material in a painless way. One of the marginal students commented, "I enjoyed it. I think the slideshow was a good way to input information into our brains." Others noted that it "jogged" their memory, or that they were surprised they "remembered everything like [they] did." Even the better students felt the slideshow was helpful. One said, "I felt I did learn faster from it," while another noted the ease of recall: "It was good because I knew all these answers without really studying them that much." The remaining students found the slideshow interesting and likable (n=4 marginal students, n=2 better students), or that it was preferable to taking notes (n=1 better student).

Both marginal (35%, n=5) and better (19%, n=3) students felt the activations stage helped them learn the material, such as the following marginal participant: "I enjoyed it. I actually learned a great deal that day, more

than I thought. I learned a lot just by sitting there and listening."

Of interest, prior performance in the class appeared to play a role in the tenor of the qualitative comments provided by the participants about the activations stage. Two of the better students made negative comments about the activations stage; one felt uncomfortable during the activations stage due to being "put on the spot" and would have preferred to have taken a written test and the other "found no use in it." Two others had lukewarm comments (e.g., that it was "ok"). Only one marginal student, on the other hand, had a complaint- that the exercise was "not very organized."

The remaining participants focused on the innovative and fun nature of the game employed during activations stage, calling it interesting (n=1 marginal student, n=2 better students), fun (n=2 marginal students, n=4 better students), or simply stating that they "liked it" (n=1 marginal student, n=1 better student).

Discussion for Experiment One

The first set of analyses showed that those who viewed the accelerated learning inspired slideshow scored significantly higher on the recall tasks than those who received the material in printed form. Given that the only difference between the two groups was the style of presentation, it appears that accelerated learning played a role in the increased scores. These findings indicate that instructors may employ AL-inspired computerized slideshows with satisfactory results, thus ex-

panding the utility of the sometimes difficult to implement exercises. Although they take many hours to set up, the slideshows are reusable and can be modified with ease.

That the differences in the participants' performance could be attributed to their increased ability to provide correct answers is instructive. This points to the ability of the AL-based slideshow to reduce the amount of thought that individual learners must undergo in order to recall their answers. The slideshow helped the participants easily and accurately remember and recall the course material.

The results of the split level analysis of marginal and better students indicates that AL-inspired techniques may be especially appropriate for students who are not at the top of their classes. In fact, viewing the AL-motivated slideshow seems to have brought the performance of the marginal students up to the level of the better students who were not exposed to the slideshow, as indicated by the findings in Table 3. It is also interesting that the slideshow had no significant effects on the better students' free recall of the nine-item list, probably because their memories were sufficient without the benefit of the slideshow. It is possible that AL-inspired strategies may be a way to minimize the differences between more capable students and those who struggle with the learning process.

The final quantitative analysis, of the four groups combined, showed that the highest total and recall

scores were obtained by those who attended both stages of the AL-motivated activity. It also points, however, to the possibility that exposing students to the activations stage without the benefit of the active and receptive concerts may serve to confuse them. Until further research is done on this potential downside, it may behoove instructors to exclude such students from the activations stage or to provide them with alternative activities during the activations.

It is clear from the qualitative comments that both marginal and better students found the accelerated learning methodology to be helpful to them. Some even appeared surprised at their abilities to remember the material. Of interest, the better students were more likely to focus on more tangential aspects of the activity, making either negative comments about or noting the novelty of the activations stage (69% of their responses compared to only 36% of the marginal students responding thusly). From their comments, it appears that the better students view AL-based approaches in general as interesting due to their innovative nature, while the marginal students view them as helpful in an almost magical sense. Possibly due to their unexpected abilities to perform well on the memory tasks, the marginal students were more accepting of both stages of the activity. The better students, on the other hand, may have viewed the process with a bit more suspicion given their abilities to succeed using more traditional means of studying (e.g., answering quizzes rather than being called upon).

In conclusion, much more research needs to be done in this area. It is unclear at present whether computerized slideshows played to the sound of AL-inspired music can improve the learning of students in other settings. It is also uncertain how long the effects of an AL-motivated slideshow last. Finally, it is important for researchers to explore the possible deleterious effects of allowing those who have not viewed a slideshow to participate in the activations stage. In the end, AL-based computerized slideshows may be a way to improve the learning of students while embracing interactive technologies that so many instructors are striving to include in their teaching portfolios.

In order to address some of these questions, a second experiment was undertaken. The second experiment was conducted in another course (to extend the results to other settings), and the post-test was delayed for an additional three weeks (to determine whether the technique is effective for longer-term retention). One final difference distinguished the two experiments; the second study sought to develop an alternative activations stage activity, one that could easily be adapted into any course, including distance learning or WWW-based curricula.

Experiment Two: Distance Learning Adapted Approach using Computerized Slideshows

The participants were 20 undergraduates in an upper division research methods and statistics course taught in a sociology department. Equal numbers were female (70%, $n=14$) and white (70%, $n=14$; the remain-

ing students were black). The majority were upper division students; 20% (n=4) were sophomores, 55% (n=11) were juniors, and 25% (n=5) were seniors. One student had taken the American Courts System class during the previous term and had viewed the slideshow used in that course; the others had never experienced an AL-inspired slideshow presentation.

The experimental treatment consisted of exposure to a computer generated slideshow identical in style to that employed in experiment one, summary slides followed by informative slides followed by recap slides. The subject material covered included one of the most difficult concepts to teach to undergraduates: threats to the internal validity of research. The slideshow was introduced and played as in experiment one, and the same music selections were used. Due to the greater amount of material, the slideshow was substantially longer than in the first experiment (107 vs. 46 slides). The slideshow began with 16 images (each depicting visually one of the threats to internal validity and its definition), then presented those images coupled with two examples and a summary slide for each threat, and then concluded with the same 16 images from the beginning of the show.⁹ Because they were directed not to take notes, every student was promised a take-home copy of the text appearing on the slides. As in experiment one, the take-home sheet was identical to the slideshow, except that it lacked the visual images and, of course, the AL-inspired music in the background.

The slideshow was shown twice. Due to its length

(22 minutes), the students were only obligated to watch the first showing. They were told they could either watch the second showing (to get any material that they missed during the first showing) or rest their heads on their desks and reflect upon what they had just seen; most of the students chose to rest during the second showing. As in experiment one, the music continued after the showing for the receptive concert, during which the participants rested and reflected on what they had seen. After the receptive concert, the students were directed to write down everything they remembered about the slideshow. The amount of detail remembered by some of the students was literally amazing. One participant remembered nearly everything presented during the slideshow, and said that the placement and colors helped her to recreate the slideshow almost in entirety. Of interest, three participants chose to spend the slideshow time writing notes to one another or looking out the classroom window.

The activations stage took place during the next class meeting, two days after the active and receptive concerts. In order to make the process more compatible with WWW-based and distance learning formats, the activations stage was modified substantially. The participants were told instead to write down as much as they could remember about the slideshow, then turn to a neighbor and discuss the differences in their lists.¹⁰ The individuals who had not been present for the slideshow participated in the activations stage, but were asked to remember as much as they could about threats to internal validity from the textbook reading. Although

it was modified substantially, this activations game retained parts of the "fun and deliberately childlike environment" recommended for accelerated learning. The participants were told that there were no mistakes, that errors would actually show that they wanted to learn the material and were pushing toward that goal.

Four weeks after the slideshow, the participants were surprised with a 35-point "extra-credit" exam. The participants were told that the number of extra-credit points they received would be based on the number of correct answers they provided on the exam.¹¹ Each participant was asked to answer two direct questions about internal validity and to recall and define (or demonstrate understanding of) the 16 threats to internal validity. The answers appeared both on the take-home sheet provided to all the students and in the slideshow.

In all, ten participants completed both days of activities, four saw only the slideshow, two participated only in the activations stage,¹² and four were present for neither stage. Due to this distribution and the low number of final participants (N=20), the participants who saw the slideshow were compared to those who had not.

The outcome variables

There were a total of five dependent variables in this study. The primary outcome variable was a participant's total score on the test. Answers were scored using a two prong scale: 0 = incorrect, 1 = correct.¹³ There were 35 possible points on the test; the highest

score was 29 points, the lowest was 4 points, and the average was 18 points.

The second and third dependent variables were the accuracy of the participants' answers to two open-ended questions about why threats to internal validity are a problem in research and why "local" threats to internal validity are more difficult to isolate and address. Most (60%, $n=12$) received partial credit for the first question; 10% ($n=2$) received two points and 30% ($n=6$) received no points. Only 20% ($n=4$) answered the second question correctly; the remainder (80%, $n=16$) received no credit.

The fourth and fifth outcome measures were the actual number of threats a participant recalled and the actual number of threats a participant was able to show mastery of by providing accurate definitions or clear examples. The typical participant recalled 8 items; the most recalled was 15 and the fewest was one. The typical participant accurately defined four items; the most defined was 13, and the fewest was zero. Table 5 presents a summary of all of the outcome measures.

Table 5: Summary of the five dependent variables for experiment two

Variable	Average	Std Dev	Minimum	Maximum	N
total score	13.20	7.76	3	29	20
# recalled	8.15	3.99	1	15	20
# defined	4.05	4.42	0	13	20
question #1	.80	.62	0	2	20
question #2	.20	.41	0	1	20
midterm exam	71.50	13.44	34	93	20

Comparison of those who viewed the slideshow to those who did not

As expected, those who had seen the slideshow performed better than the control group (who did not). Those who viewed the slideshow received significantly higher total scores on average (15.4 versus 8.2, $t=-2.88$, $p=.01$) than those who received only the printout of the information contained on the slides. This difference may stem from their greater ability to recall the information (9.3 versus 5.5 items, $t=-2.21$, $p=.05$). Of interest, and probably due to the reduced existence of variance, the experimental group did not perform significantly better than the control group on any other single measure of performance. Finally, while the control group technically outperformed the experimental group on the midterm exam (a measure of prior performance), these differences were not significant (69% versus 76%, $t=1.60$, n.s.). See Table 6 for these comparisons.

Table 6: Comparisons of slideshow viewers to control group for five outcomes

Outcome measure	Slideshow Viewers: mean (std dev) (n=14)	Control Group: mean (std dev) (n=6)	t score, prob.
total score	15.4 (8.25)	8.2 (2.86)	-2.88, .010
# recall	9.3 (3.77)	5.5 (3.39)	-2.21, .050
# defined	4.9 (4.9)	2.0 (1.9)	-1.91, .072
question #1	.86 (.66)	.67 (.52)	-.69, .502
question #2	.28 (.46)	.00 (.00)	no variance
Midterm exam score	68.9 (12.4)	77.5 (9.08)	1.60, .130

Due to the small sample size, no multivariate analyses were attempted, nor were any split level analyses completed. Of interest, when the three participants who were not paying attention during the slideshow were excluded, the total score gains attributed to the experimental group increased (16.8 vs. 8.2, $t=-3.00$, $p<.01$), and the numbers of accurately recalled (9.7 vs. 5.5, $t=-2.31$, $p<.05$) and defined threats (6 vs. 2, $t=-2.28$, $p<.05$) was significantly higher for the experimental group.

Discussion for Experiment Two

The second experiment replicated the beneficial results attributed to accelerated learning (AL) inspired slideshows. Given that the only difference between the two groups was the style of presentation, it appears that accelerated learning played a role in the increased scores. The second experiment involved an activations stage that is more conducive to use with WWW-based or distance learning techniques. Indeed, instructors can simply put their slideshows and music selections on the WWW, and allow students to watch the session as often as they wish.

Discussion comparing both experiments

Before comparing the results of the experiments an important caveat must be mentioned. Owing to the small class sizes at the university at which the experiments were conducted, the samples in both experiments were rather modest. While small sample sizes are normally expected to downplay the magnitude of a study's findings because the statistical tests require greater dif-

ferences with fewer study participants, it is possible that the findings would have been substantially different if just one or two participants scored differently on the post-test. In addition, having so few subjects may affect the external validity of the experiments because larger numbers of participants increase the representativeness of the sample. In other words, having a larger sample would help ensure that the findings found for the students who participated in these two experiments were not situation-specific and would instead generalize to other samples, settings, and times. That the current study had similar results for two experiments using different subject material, general approach, lag times between exposure and posttest, and cohorts of students lends support to the overall findings.

As would be expected, the slideshows depicting more difficult material resulted in less mastery. Importantly, however, the percentages of increase remained stable over both experiments. In the first experiment, the experimental group enjoyed a 19% increase over the control group (74% vs. 55%). Similarly, in the second experiment, the "grades" assigned to the experimental group were 20% higher than those assigned to the control group (43% vs. 23%).¹⁴ In both cases, the typical student scored a full two grades higher on the open-ended exam if s/he saw the AL-inspired slideshow (vs. receiving the material in printed form). Regardless of the difficulty of the material, students' retention can be significantly increased through the use of AL-inspired slideshows.

The lower overall scores in the second experiment may also be due to the greater time lag. The post-test in the first experiment came one week after the stimulus slideshow, whereas the post-test for the second experiment occurred a full four weeks later. Once again, however, the increases were consistent over both time periods, indicating that long-term retention of the material is improved for those who viewed the slideshow.

It is also possible that the reduced retention observed for the second experiment (vs. the first) is due to the use of the alternative activations stage (i.e., one that is less congruous with those normally utilized in accelerated learning situations). Further research is needed to explore this possibility and to develop other distance-learning-compatible strategies should the alternative technique be responsible for the lowered retention observed in the second experiment.

One interesting development in the second experiment was the effect of the longer session on the attention paid by the participants. Three (15%) of the twenty participants paid little attention to the slideshow beyond the first few slides. Instead, they passed notes among themselves and looked out the window. This problem indicates that lengthy slideshows may be less effective than short, well-planned sub-units. It also points to a shortcoming in AL-inspired techniques. Learners who purposely ignore the learning message cannot receive the benefits from the innovative techniques to which they are being exposed. Indeed, when

the three participants were excluded from the results, greater differences existed between the control and experimental groups.

AL-based computerized slideshows seem ideally suited to learning lists of items and repetitive processes (e.g., mathematical computations). Due to their non-interactive structure, it is important that the material selected for the slideshows is such that questions are not expected to consume a great deal of time. The use of AL-motivated computerized slideshows in the natural sciences may take on increasing importance as those fields strive to make their fundamental knowledge easier to digest by the contemporary student. Employing pictorial mnemonics not only forms the basic foundation of the slideshow, but also seems to organize the final product into a truly useful tool.

For WWW-based and distance learning applications, these findings suggest that merely viewing the slideshow and participating in the alternative activations stage (i.e., writing down all they know and discussing their lists with a classmate) is as effective as "full-blown" accelerated learning approaches. This technique can easily be adapted to the WWW, allowing teachers to bring accelerated learning to the proverbial "classroom without walls."

Endnotes

¹ One participant did not complete the second questionnaire due to time constraints; this one individual is included in the analysis of the recall information, but had to be excluded for the remainder of the analyses.

² The picture-based slides were shown for six seconds each. The text-based slides were shown for 15 to 25 seconds each, depending on the amount of material presented. The slideshow was pretested by a naive subject to ensure that each slide could be read by an undergraduate within the allotted time.

³ Eight individuals who had not been present for the slideshow participated in the activation stage. They were given the take-home notes and told to play along anyway, so as not to disturb the flow of the exercise for those who had attended the first day's activities. In addition, three individuals who had attended the slideshow failed to attend class for the activations stage.

⁴ At first, those who missed questions were reluctant to take a prize, but after the first few errors, the game was in full swing. One participant later described the event as "wild." One unique problem was the occasional blurting out of answers by individuals other than those to whom the bag was tossed.

⁵ This was not entirely true. In actuality, all the participants who completed the exam were awarded the maximum of three extra credit points because it was later found that basing their points on the correctness of their answers would penalize the control group.

⁶ Two of these were students with high prior performance scores who were given the day off from class without losing attendance points as a "reward" for their good performance. A third participant was offered the same deal, but did not show up for the activation stage either. The three individuals were selected in order to help ensure that the experimental and control groups were of comparable academic ability.

⁷ Including the one participant discussed in the previous footnote.

⁸ Due to possible multicollinearity problems, the score for the final was not included in the prior performance measure.

⁹ The picture-based slides were shown for ten seconds each (to allow for absorption of the definition). The text-based slides were shown for 12 to 25 seconds each, depending on the amount of text presented. The slideshow was pretested by a naive subject to ensure that each slide could be read by an undergraduate in the allotted time.

¹⁰ This exercise could be done via email or phone for distance learning and WWW-based courses.

¹¹ As in the first experiment, this was not entirely true. All the participants who completed the exam were awarded the maximum of three extra credit points.

¹² One of these was a student with a high midterm exam score who had been given the day off from class without losing attendance points as a "reward" for the high grade. This individual was selected in order to help ensure that the experimental and control groups were of comparable academic ability. A second individual was also given the day off, but failed to show up for either of the experimental days.

¹³ The answer to one of the questions was worth two points, so partial credit (i.e., one point) could be earned by participants who answered part of the question correctly.

¹⁴ The low raw percentages achieved on the post-tests may result in part from their surprise nature; the students had not been informed that they would be asked detailed open-ended questions in either experiment. While each post-test was given in conjunction with the regularly scheduled final exam, the students expected only one or two questions from the slideshow material and the final exam questions were multiple-choice recognition items.

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New Employee Orientation Using Accelerated Learning Techniques

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Introduction

Training and development exists at all levels of business organizations. Training is used to teach technical skills, sales techniques, supervisory skills and management development. Training is also used to assist in the gathering of job related skills. Examples are computer literacy, safety, new job orientation, writing and the technical skills particular to an industry. Training is also utilized in developing "people" skills such as improved communication, effective listening and dealing with conflict (Opinion Research Corporation, 1986).

Business and industry are very active in the field of educating people. In fact, the business world spends

30 billion dollars a year in direct costs on training at all levels (Bove, 1986). In order to best use the ever-increasing dollars that are spent, to stay competitive, and to run their companies more efficiently, business and industry are continually looking for new and better ways to train their personnel. Accelerated Learning is an extremely effective method that is finding its way into the business world.

Review of Literature

A comprehensive study conducted by the Opinion Research Corporation (ORC) (1986) and sponsored by the American Society for Training and Development (ASTD) brings to light the current state of training in the United States. This study found that most corporate leaders indicate that employee training is an integral part of their corporate strategic planning. The participants, 756, training and development executives from companies with at least 250 employees were called using a random stratified sample, of which 93 percent agreed to participate. The three topics most frequently included in training programs are employee orientation, supervisory skills and management development. With regard to the latter two topics the ORC/ASTD study finds that the two subjects that receive the most attention are performance appraisals and employee discipline.

The training methods vary. The most common training methods are lectures, discussion groups, audio-visual techniques, case studies and role-playing.

While all of these methods have their limitations, executives reported that using them in combination results in better-trained employees (ORC, 1986). Although there are various training methods, the current ones still fall short on at least one of the goals, retention rate after the training is completed. According to the ORC/ASTD study almost 60 percent of the respondents say not being able to maintain the skills and behavior on the job is a major problem (ORC, 1986). As one can see traditional methods of learning are under more scrutiny as the business field searches for more effective and efficient ways to learn.

One method of learning that has a spotty record of implementation in business and industry is Accelerated Learning. Accelerated Learning is shown to be an easy, relaxing way to learn, that speeds up the learning process. Most researchers have found speed increases of up to two to three times. However, in some instances learning was five to ten times faster (Schuster, 1986; Ostrander and Schroeder, 1974). There are many components that make up Accelerated Learning.

A major component of Accelerated Learning is a reliance on music, specifically Baroque. Baroque music has consistently been shown to be a powerful tool in the facilitation of learning (Bancroft, 1981; Redman, 1984; Schuster, 1985; Stein, 1982; Summer, 1981). It aids in the relaxation of the body and brain. Music is shown to alter the heart rate, pulse rate, blood pressure, respiration, galvanic skin response, muscular responses and brain waves (Redmond, 1984). Slow

movements from Baroque music are played at 60-70 BPM, the same as the body's heart rate, which is generally 65 beats per minute. When music is played, the body becomes synchronized with it. An optimal learning situation is one in which the learning environment and learner have become harmonious.

Another major portion of Accelerated Learning consists of relaxation exercises. These are designed to help ease muscular tension in the body and to suspend worries and problems within the mind during the learning session. Prichard and Taylor (1976) reported that people need to learn how to relax and that relaxation is a major factor in learning. Haines (1982) reported that school aged children improve their reading skills as a result of relaxation training. Also, it has been shown that adult learners benefit from relaxation training (Barber, 1982).

Imagery is another element of Accelerated Learning. Research in imagery repeatedly shows an increase in memory when using the technique (Piccolo and Render, 1984; Schuster, 1981; Stein, 1981).

Although less frequently mentioned there are other important factors that make Accelerated Learning successful. Two of the lesser used, but integral, components are presentation style and breathing techniques (Ostrander and Schroeder, 1974; and Schuster, 1986). However, these two elements are often excluded in research projects and lesson plans (Reed and Schuster, 1985). Reed and Schuster found that out of 171 partici-

pants who had completed an Accelerated Learning training workshop at Iowa State University, only 39 of them indicated that they had used or were currently using the complete method. Of those who indicated they used separate aspects of the Accelerated Learning method, the three most utilized aspects were relaxation, imagery and music. Two aspects not mentioned in use as separate activities were breathing techniques and presentation style. Bayuk's (1983) work finds that the breathing is either being omitted or modified to such a degree that the original rhythm is no longer recognizable.

In reviewing the literature it becomes very clear that the majority of studies incorporated the components of relaxation, imagery and music. It is also apparent that research on other elements is lacking. Research on the aspects of breathing technique and presentation style needs to be done in order to ascertain whether they positively influence learning or not. Also, unanswered is the question of what effect these two components will have on learning when coupled with the more popular ones.

The other finding in the literature is the absence of research done with adults in non-educational settings. In reviewing the *Journal of Accelerated Learning and Teaching* from 1981 to 1985 it was found that only one out of 47 research articles dealt with adults in a business/industry setting.

In order to increase the knowledge base in the

two aforementioned areas a project was designed to answer the following questions:

- 1) Is a business setting an appropriate arena in which to conduct research on Accelerated Learning?
- 2) Do the components, breathing technique and presentation style, positively influence learning?
- 3) If the two components do in fact facilitate learning, what is their combined effect when coupled with the aspects of music, relaxation and imagery?

Methods

The design was a two by two factorial. The specific variables to be researched were breathing technique and presentation style. All four groups received baroque music, mental and physical relaxation, affirmations and imagery, but were divided as to their reception of the breathing techniques and presentation style. The four groups were as follows:

1. Group One received the information without the breathing technique or presentation style.
2. Group Two received the information while utilizing the breathing technique, but not the presentation style.

3. Group Three received the information in the presentation style but without the breathing technique.
4. Group Four received the information while utilizing the breathing technique and the presentation style.

		Breathing Technique	
		No	Yes
Presentation	No	Group 1	Group 2
	Yes	Group 3	Group 4

The hypothesis is that:

- a. Group One will have the lowest test scores.
- b. Group Two and Group Three test scores will fall between groups one and four.
- c. Group Four will have the highest test score.

The format used pertaining to the breathing technique was to breathe out for four counts, breathe in for four counts and hold for four counts. The researcher would then recite the item description or the name of the vendor catalog while the participants held their breath. An example was: I would say "breathe out"..., "breathe in"..., "hold your breath." Then I would say "air filters". Then I'd say "breathe out"... "breathe in"... "hold your breath"... "Fram".

The presentation style was reading the information in either a soft, dramatic, or monotone voice. Reading in rhythm meant to read the words in sync with the melody of the music.

Sample

The sample consisted of 31 new employees of a retail automotive parts store. The participants were selected by the company to be interviewed. They were ultimately hired based on a combination of their retail experience, auto parts experience, honesty, and customer service skills. Each week a new group of people was hired and trained. Therefore, each week consisted of a specific group. Since two of the groups (three and four) had less than the minimum five required participants, I used two different training groups in order to obtain a sufficient population. Since it was not possible to give the initial presentation to the entire group and then randomly assign the subjects to a treatment group, other means were used to ensure objectivity. The techniques the treatment groups received were randomly drawn each week. The first training session had a pos-

sibility of any one of the four sets of methods. The second training session had a possibility of the three remaining. The third training session had a 50-50 chance between the remaining two technique styles. Only in the last training session was it known beforehand what treatment procedures would ultimately be used.

Intervention

This research project was implemented into the company's regular new employee training program. The regular training program lasted 32 hours and covered many topics. This project was three and one half hours long focusing on only one topic. This research project was incorporated into the 32 hour training program. The company's history showed that the new employees, even after completing the training, did not know how to fully utilize the catalogs to look up part numbers. Based on this history, they requested that this project focus on learning how to better use the catalogs.

The intervention consisted of the author presenting a one hour presentation of Accelerated Learning on day one and training/testing on day two. The first presentation partially consisted of a brief history of Accelerated Learning and the rationale behind the company's desire to integrate it into their new employee orientation. Additionally, an explanation of the major components of Accelerated Learning and the rationale behind their inclusion was involved.

The last part of the presentation session encompassed the participation in two relaxation sessions. The

first one was a progressive physical relaxation and the second one was a mental relaxation. Near the end of the mental relaxation session the participants were given four affirmations regarding the joy and ease of learning in general and then specifically regarding the catalogs. Next the participants were led in a brief imagery seeing themselves successfully looking up the correct part numbers in a fast, efficient manner.

After each relaxation experience the group debriefed. They shared their thoughts, feelings and experience with each other. Both relaxation sessions were taken from the book, Superlearning, by Ostrander and Schroeder. Throughout the entire one hour presentation baroque music was played. The specific tape of music was "In Performance" The Baroque Masters.

The next day's session was two and one half hours long. The first phase was to go through the two relaxation sessions, affirmations and imagery. This was done sequentially with no debriefing. The new employees were then introduced to the catalogs by way of a brief description and demonstration of each vendor catalog and the part they manufacture. The participants then were given three to five sample parts to look up. The information given was the part, make, model, year and engine size of the vehicle. The participants then used that information to go to the correct vendor catalog and retrieve the correct part number.

Following the sample portion, the participants sat in a relaxing manner with their eyes closed. The researcher proceeded to recite the index of the catalog.

The index consisted of the item description on one side of the page and the vendor catalog on the other. It was at this juncture that the specific variables were utilized. Specifically, Group One received the catalog index information, but with no specific breathing technique or presentation style. Group Two received the information while utilizing the breathing technique, but not the presentation style.

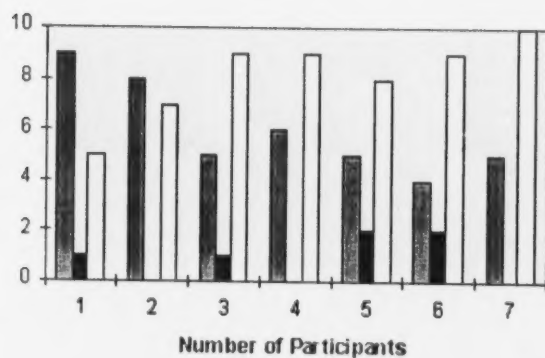
In those groups where the breathing techniques were utilized the participants practiced until they were able to breathe according to the specific cadence while being read information. This mini-training session took roughly 20 minutes. Then and only then were they read the item index. The final step was to have the participants complete the progress check. The procedure was the same as the sample section but the part numbers to be looked up were 15 different items. The participants had ten minutes to complete the progress check. Once again Baroque music was played during the entire session.

Results

An ANOVA and T-test analyzed the data between groups. The independent variables were the breathing technique and the presentation style. The dependent variable was the number correct on the test. Baroque music, relaxation, and imagery were held constant over all of the groups.

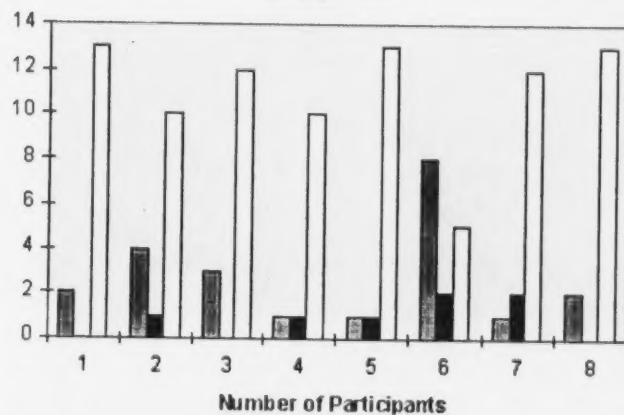
The raw scores of the participants are found in Table One.

Group One



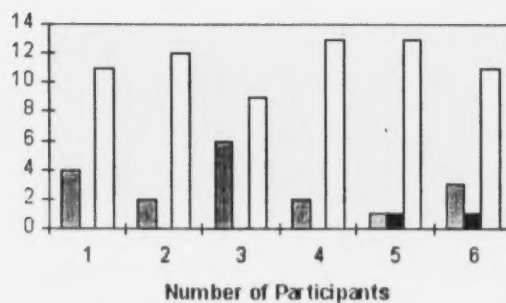
answered right # answered wrong did not answer

Group Two



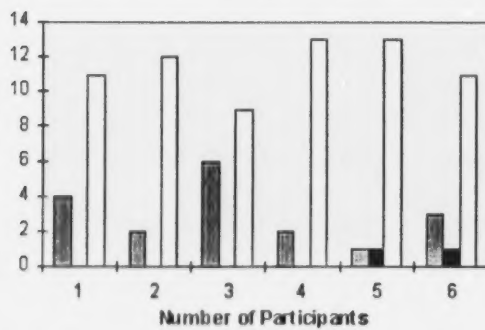
answered right # answered wrong did not answer

Group Three



answered right # answered wrong did not answer

Group Four



answered right # answered wrong did not answer

The ANOVA was run on the four groups using the number of questions answered correctly. There was found to be a significant difference by groups in the mean score of the number right. The significance was .016.

**Table Two: Analysis of Variance
(number right by group ID)**

	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects	49.821	3	16.607	4.118	0.016
Residual	108.889	27	4.033		
Total	158.71	30	5.29		

Paired comparison T-tests showed that there was a significant difference between the means of Group One (no presentation style and no breathing technique) and Group Two (breathing only). Group One had a mean of 6.0 and Group Two had a mean of 2.66. This was significant at the .005 level. When group one was compared with Group Three (presentation style only) there was a significant difference at the .013 level. The mean difference was 6.0 for Group One and 3.0 for Group Three. When comparing Group One and Group Four (Group Four employed both the breathing technique and presentation style) there was found to be no significant difference at the .05 level. Group Four's mean was 4.1.

These results indicated that having, (1) presentation style and breathing present together, or (2) both

of them not present, enhanced the learning process, but individually breathing technique and presentation style confounded the learning process.

When comparing Group Three with Group Two, the 2-tail probability was not at significant levels, .755 and .286 respectively. However, they both had negative T values, -.32 and -1.12 respectively.

Table Three: T-Test (descriptive data)

Group	# of Cases	Mean	Std. Dev.	Std. Error
1	7	6.000	1.826	0.690
2	9	2.666	1.789	0.745
3	6	3.000	2.236	0.730
4	9	4.111	2.028	0.676

Table Four: T-Test (Group Comparison)

Group Probability	F Value	T Value	Freedom	Tail
1 and 4	1.23	1.96	13.63	0.071
1 and 2	1.50	3.28	13.94	0.005
1 and 3	1.04	2.99	10.76	0.013
2 and 4	1.22	-1.44	15.85	0.171
2 and 3	1.56	-0.32	12.42	0.755
3 and 4	1.28	-1.12	11.82	2.860

Discussion

In reviewing the questions and the hypothesis the results of this project are mixed. The first question is whether a business setting is an appropriate arena in which to conduct research on Accelerated Learning.

Based on the results of this research project and the supports of its company sponsors I found that business and industry are receptive arenas in which to conduct research utilizing Accelerated Learning.

The second question is "Do the components, breathing technique and presentation style positively influence learning?" The results of this study find that those two components do not. In fact, the results indicate that those two components negatively influence learning. The result of this study contradict earlier studies (Ostrander and Schroeder, 1974; Schuster, 1986). The third question ponders the combined effect of presentation style and breathing technique with music, relaxation and imagery. Group 4 represents this question. The results suggest that utilizing all of the components does in fact facilitate learning.

The hypothesis, however, is not supported by the results. The hypothesis suggests that there will be an order effect. The group that gets neither the breathing technique nor the presentation style would have the lowest test scores. Additionally, the two groups with only

one component would have middle range test scores. The fourth group, with both components, would have the highest test scores.

The results of this project were somewhat surprising and quite different from the hypothesis. Group One, with no breathing technique nor presentation style, was found to have a significantly higher rate of learning than Group Two, breathing technique only, and Group Three, presentation style only. Group One, also, had a higher group mean of correct answers than Group Four, but not at a significant level.

One possible answer is that the process of having only breathing techniques or presentation style merely served to confuse the learner. The learner's attention and energy were focused on the techniques and not what was being taught. Another similar possibility was that presentation style and breathing technique were merely distracting elements and that the major components of Accelerated Learning, Baroque music, relaxation and imagery are truly what increase learning. Perhaps the former components do not add any significant difference.

Based on my experience, the components of breathing technique and presentation style were the most difficult to implement and master. What might be called for is additional training so the components are a help and not a hindrance.

Another cautionary note would be the relatively small sample size. With only 31 participants the find-

ings need to be viewed as preliminary. It is suggested however, that those who are interested in Accelerated Learning choose to broaden their horizons and see the business field as an area that is accessible and ready. Also, it is important to deepen the roots by doing more research into what actually is crucial to Accelerated Learning, specifically the components of breathing and presentation style. This study has attempted to both broaden the horizon and deepen its roots.

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***A Review of Krishnamurti, J. (1994)
On Learning and Knowledge***

**Elliot A. Ryan
Quantum Leap In Learning &
New Pastures Press**

On Learning and Knowledge (149 pages, paperback) published in 1994 by Harper, San Francisco is a collection of talks given by J. Krishnamurti, a renowned world teacher of the twentieth century. Some of these talks were presented in the dialogue format with students and teachers; all nineteen talks were given between the years 1952 to 1979 in either Switzerland, UK, India or the USA.

Readers unfamiliar with J. Krishnamurti, but familiar with the quotation, "Children learn best when they are helped to discover the underlying principles for themselves,"¹ will be pleased to find out that this message was the major thrust of what Krishnamurti had been saying to children and adults for over sixty-five years. The foreword to *On Learning and Knowledge* states it, so: "The need for self-knowledge and understanding of the restrictive, separative influences of religious and nationalistic conditioning was constantly stressed."

In "K's" own words, one gets a clearer, deeper meaning:

"The ascent of man does not lie in accumulated knowledge. . . Scientists and others have said man can only evolve by having more and more knowledge, climbing, ascending. But knowledge is always the past; and if there is no freedom from the past, his ascent will be always limited. It will always be confined to a particular pattern. We are saying there is a different way of learning, which is to see comprehensively, wholly, holistically the whole movement of knowledge. Knowledge is necessary; otherwise you couldn't live, but the very understanding of its limitation is to have insight into its whole movement. We have taken knowledge as natural, and live with knowledge, and go on functioning with knowledge for the rest of our life, but we have never asked what knowledge itself is, and what its relationship is to freedom, what its relationship is to what is actually happening. We have taken all this for granted. That's part of our education and conditioning." ²

In the Brockwood Park, UK, 31 August 1978 talk; chapter, "K" delves into how knowledge is accumulated: "acquire knowledge and then act, or act and from that action accumulate knowledge. Both tend to be mechanical." This being clear he then asks, "is there a way of learning that is non-mechanistic?"

His approach in speaking and writing when exploring "learning and knowledge" is like a long-distance walker taking shuffle-steps. No ground is overstepped no matter how distant the journey. Yet, in one giant leap "K" asks, "Can you observe this phenomenon of registration, learning, relationship as a whole? I mean by a whole having deep insight into the whole thing instantly. Can you have perception of the entirety of the structure?"

He is fond of saying in dialogue with others and with himself as speaker: "Do please inquire, question, challenge for yourself, and find out. Don't jump to conclusions; don't say 'spontaneity'; don't say 'intuition'. Let's not be caught in words. Is there a way of learning that is not mechanical?"

He suggests, "we start by honestly saying 'I really don't know.' It is rather difficult, because when you don't know you are looking, you are trying to find out if you know. When I say 'I don't know', there is always the desire to find out, or I expect to be told, or I project some hidden hope, and that becomes an idea and I say, 'Yes, I begin to capture it'. So, can you be free of all that and say, 'I actually do not know'? Then you are curious, you are really curious, like a young boy or a girl learning for the first time."

On the subject of not knowing a questioner asks, "do you always start with not knowing when you come to speak; are you always completely free of what you know before?" "K's" reply was reminiscent of explanations given by people who have learned to mentally

process the printed page at rates of 20,000 words per minute or have learned four to six hundred words of a new language in one day. That is to say, 'yes, I got it right but I don't know what I know.' "K" said, " Please, I don't prepare talks, I don't do anything. No I don't, I am doing it now. Please ! When you say actually you don't know, you stop the mechanistic process of learning, don't you."

"K" says it another way: "That hope, conclusions and even motive have no place in holistic learning whatsoever because they all give direction and then one has lost it. I must be very, very clear and terribly honest in myself to say I really don't know. Knowledge is undoubtedly useful, at one level, but at another it is positively harmful."

We see in the contrast between motive vs. no motive that one can learn just to learn, not having in mind what it can do to improve this or my that — my grades or my earnings ability. The knowledge of what will happen if I don't get good grades or increase my earning power brings on, the harmful arch enemy of learning: fear.

"To learn, there must be listening, and when you listen, there is attention, And there is attention only when there is silence. So to learn there must be silence, attention, and observation. And that whole process is learning - not accumulating - learning as you are doing; learning in doing, not having learned and then doing. We are learning as we are going, as we are doing, not learning, then doing. The two things are entirely

different"³

Exploring the meaning of inquiry, freeing the mind of prejudice, habits, conclusions and opinions and understanding the whole nature of the mechanistic acquisition of knowledge "K" raises the question 'can I observe myself through relationship'? Exploring relationship with "K", one finds that much of it is seeing with images. "When she has an image and you have an image, there is division, and the whole conflict begins. When there is division between two images, there must be conflict."

Adding to the understanding of conflict "K" asks, "how is a human being to bring about such a change in himself that he still remains in this world, functions technologically, and is able to reason sanely, rationally, healthily? Will - that's desire strengthened - does not bring about change. Because in that exercise of will, there is conflict, obviously, there cannot be change." . . . "The very nature of will not only is the product of conflict but also creates conflict." . . . "The first thing to realize is that conflict, however much it is part of your life, cannot possibly produce under any circumstances a life of deep awareness, silence and beauty."⁴

Throughout the book "K" fields question after question casting doubt on the question itself to plunge ever deeper into the inquiry.

In a chapter entitled: The Learned or the Wise from Commentaries on Living First Series, the author explains: "understanding does not come with knowledge. In the interval between words, between thoughts,

comes understanding. This interval is silence unbroken by knowledge; it is open, the imponderable, the implicit. Is not knowledge useful, essential? Without knowledge, how can there be discovery? Discovery takes place not when the mind is crowded with knowledge but when knowledge is absent; only then is there stillness and space and in this state understanding or discovery comes into being." In another central question "K" asks, "Can I observe myself without any shadow of distortion; can the mind observe its activities without prejudice?" "K's" holistic, manner of discovering one's underlying principles for oneself calls for insight which takes purposelessness — a common trait for youngsters.

"Einstein was a physicist and not a philosopher. But the naive directness of his questions was philosophical."⁵ Likewise, Professor Ravi Ravindra remarked with affection, "Krishnamurti, you are really a scientist of the internal."⁶ In *On Learning & Knowledge* readers can fully grasp the meaning of Professor Ravindra's assessment.

This book goes deeply into questions that free one's mind up to make it super alert.

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Notes

¹ The Everyday Genius, Peter Kline

² Ojai, CA, 15 April 1979

³ Bombay, 16 February 1966

⁴ Bombay, 16 February 1966

⁵ C.F. von Weisaecker, page 159 quoted in *Albert Einstein*
by Aichenburg and Sexl

⁶ Pages 263 and 264 *The Kitchen Chronicles* by Michael
Krohnen

Sources of reference information on accelerated learning

The easiest access to published information on accelerative (-ed) learning, SALT, suggestopedia, and Super Learning is through the ERIC system available in many university and college libraries. Secondary sources are *Dissertation Abstracts* and *Psychological Abstracts* along with the periodic author and topic indices of the *Journal of Accelerative Learning and Teaching*. Chapter 3 of *Suggestive Accelerative Learning Techniques* (1986) by Schuster and Gritton [University of Toronto Press] has an extensive review of the literature then available.

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